AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (15)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during August, 1965.

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. **SEPTEMBER 1965**

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INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

a. NASA entries identified by their *STAR* accession numbers (N65-10000 series),
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(continued)

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AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography SEPTEMBER 1965

STAR ENTRIES

N65-25572# Youngstown Univ., Ohio. Dept. of Chemistry
INVESTIGATION OF THE USE OF BIOCHEMICALS IN TECHNIQUES OF CO_2 SEPARATION AND CONCENTRATION IN AEROSPACE VEHICLE ATMOSPHERE REGENERATION PROCESSES Quarterly Technical Report
George Graf Feb. 1965 132 p refs
(Contract AF 33(615)-1777)
(QTR-3; AD-463567)

Thousand ml. solutions of 0.02-0.2M 2-amino-2-(hydroxymethyl)-1,3-propanediol and 0.01-0.02% by wt. carbonate hydro-lyase were absorbing carbon dioxide from an air stream, containing 1% CO_2 by vol., and passing through the absorber at rates of 500-1000 cc/min. in continuous operation for 90 minutes. The absorption was monitored by an infrared gas analyzer. After absorption, the solutions were regenerated, by keeping them under continuous evacuation, at 30° C. for 60 minutes. The cycles of absorption and regeneration were repeated successively over periods of 33-96 hours, including the idle times during which the solutions were not processed. During these operations the activity of the enzyme remained constant. The absorption patterns indicated that the solutions are regenerable and, at higher buffer concentrations, the solutions absorb more than 65-70% of the carbon dioxide passing through the absorber, over periods longer than 90 minutes. It was established also that higher enzyme concentrations shorten the regeneration time. Author

N65-25582# Oak Ridge National Lab., Tenn. Health Physics Div.
APPLIED HEALTH PHYSICS ANNUAL REPORT FOR 1964
K. Z. Morgan, D. M. Davis, et al Jun. 1965 87 p refs
(Contract W-7405-ENG-26)
(ORNL-3820) CFSTI: $3.00

Gaseous and liquid waste releases from the laboratory resulted in a concentration of radioactive materials in the atmosphere at the perimeter of the controlled area which was less than 1% of the maximum permissible. The number of beta curies released via White Oak Creek to the Clinch River was 234, about half the 1963 release. The average concentration of ^{131}I in raw milk samples was 11.4 pc/l, about 12 percent less than in 1963. Background measurements at five selected locations decreased by a factor of about two from 1963. The average for 1964 was 0.014 mR/hr. No employee received an external or internal radiation dose more than the maximum permissible levels; the highest whole body dose equivalent received by an employee was about 4.2 rem or 35% of the maximum permissible annual dose. During 1964 there were no cases of internal exposure where the deposition of radioactive materials within the body was estimated to have averaged greater than half of a maximum permissible body burden. During 1964 the frequency of unusual occurrences dropped to a five-year low of 29 events. About 50% of these were classified as significant. Revisions in personnel monitoring techniques and development of improved bio-assay procedures have been made. Author

N65-25590*# Brandeis Univ., Waltham, Mass. Dept. of Biochemistry
[A COMPARATIVE STUDY OF THE EVOLUTION OF ENZYMES AND NUCLEIC ACIDS] Semi-Annual Status Report, Nov. 1, 1964–Apr. 30, 1965
Nathan O. Kaplan, Lawrence Levine, and Lawrence Grossman [1965] 3 p
(Grant NsG-375)
(NASA-CR-63246) CFSTI: HC $1.00/MF $0.50 CSCL 06A

Developments are reported in a comparative study on enzyme and nucleic acid evolution. The main properties of lactic dehydrogenases from species representing all the vertebrate classes were measured for susceptibility to inhibition by high pyruvate concentration, electrophoretic mobility in starch gel, and temperature stability. An acidic protein was isolated and purified from beef brain and exhibited little evolutionary variation when exposed to antibodies. Antibodies were produced by making the protein immunogenic and complexing it with methylated bovine serum albumin. The antiserum was shown to be immunochemically homogeneous in double diffusion tests in agar with crude beef brain extract and acidic protein as antigens. Experiments in which ultraviolet photoproducts of cytosine act as uracil in RNA polymerase templating systems were completed. R.N.A.

N65-25600# Joint Publications Research Service, Washington, D. C.
STUDIES IN PHYSICAL TRAINING FOR WEIGHTLESSNESS
17 May 1965 18 p ref Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), no. 1, 1965 p 44–47, 64–70
(JPRS-30111; TT-65-31006) CFSTI: $1.00

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1. FLIGHTS AND PHYSICAL TRAINING B Yevstaf'yev p 1–6 (See N65-25601 15-05)
2. TRAINING OF A HUMAN BEING FOR WEIGHTLESSNESS A. Yeremin et al p 7–15 ref (See N65-25602 15-05)

N65-25601 Joint Publications Research Service, Washington, D. C.

FLIGHTS AND PHYSICAL TRAINING

B. Yevstaf'yev *In its* Studies in Phys. Training for Weightlessness 17 May 1965 p 1-6 (See N65-25600 15-05) CFSTI: $1.00

Exercises connected with strength and static tension were alternated with exercises in relaxation, breathing, and bearing to develop the strength of certain muscles, increase the power, and increase the static endurance of flying personnel. Test subjects who underwent static exercises for 2.5 months developed a higher ability to endure prolonged power and static tensions, than those who only undertook dynamic exercises. The best results were found in a group undergoing mixed exercise training. G.G.

N65-25602 Joint Publications Research Service, Washington, D. C.

TRAINING OF A HUMAN BEING FOR WEIGHTLESSNESS

A. Yeremin et al *In its* Studies in Phys. Training for Weightlessness 17 May 1965 p 7-15 ref (See N65-25600 15-05) CFSTI: $1.00

Considerations of the various physiological body mechanisms under conditions of weightlessness led to the following training recommendations for astronauts: neuropsychic stability training by prolonged isolation in a soundproof chamber; vestibular training by use of swings and rotating stands; and direct exposure to weightlessness of 25 to 45 second duration in parabolic flights. It was concluded that a high stability to weightlessness can be obtained under terrestrial conditions through purposeful medico-biological training. G.G.

N65-25611# Joint Publications Research Service, Washington, D. C.

SOVIET RESEARCH ON GENETICS AND PHYSIOLOGY

8 Jun. 1965 26 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR, Ser. Biol. (Moscow), v. 160, no. 1-3 1965 (JPRS-30485, TT-65-31196) CFSTI: $1.00

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1. INTERACTION BETWEEN PHYSICAL AND CHEMICAL MUTAGENS N. P. Dubinin and V. K. Shcherbakov p 1-4 refs (See N65-25612 15-04)

2. INTERACTION BETWEEN A FRAGMENT OF Hfr CHROMOSOME AND ANNULAR F^- CHROMOSOME IN THE PROCESS OF GENETIC RECOMBINATION IN ESCHERICHIA COLI K-12 V. V. Sukhodolets p 5-12 refs (See N65-25613 15-04)

3. THE RELATIONSHIP BETWEEN THE RATE OF CHROMOSOMAL ABERRATIONS AND INTENSITY OF IRRADIATION AND HUMIDITY OF SEEDS N. I. Nuzhdin and K. A. Filev p 13-17 refs (See N65-25614 15-04)

4. CHANGES IN THE MACROSTRUCTURE OF BLOOD PROTEINS DURING EXCITATION OF THE CENTRAL NERVOUS SYSTEM A. F. Makarchenko, B. A. Roytrub, and R. S. Zlatin p 18-23 refs (See N65-25615 15-04)

N65-25612 Joint Publications Research Service, Washington, D. C.

INTERACTION BETWEEN PHYSICAL AND CHEMICAL MUTAGENS

N. P. Dubinin and V. K. Shcherbakov *In its* Soviet Res. on Genet. and Physiol. 8 Jun. 1965 p 1-4 refs (See N65-25611 15-04) CFSTI: $1.00

Simultaneous action of extracts of horse bean seeds and streptomycin on the natural mutation process in root cells during sprouting of podless seeds of *Allium fistulosum L.* clearly demonstrated a protective effect. It was concluded that extracts of horse bean seeds acting on chromosomes altered by streptomycin, acquire a protective instead of a mutagenic action. These facts indicate specific interactions of primary mutagen effects at the chromosome level. G.G.

N65-25613 Joint Publications Research Service, Washington, D. C.

INTERACTION BETWEEN A FRAGMENT OF Hfr CHROMOSOME AND ANNULAR F^- CHROMOSOME IN THE PROCESS OF GENETIC RECOMBINATION IN *ESCHERICHIA COLI* K-12

V. V. Sukhodolets *In its* Soviet Res. on Genet. and Physiol. 8 Jun. 1965 p 5-12 refs (See N65-25611 15-04) CFSTI: $1.00

Recombination studies of one pair of genes P and S1A of *Escherichia coli* K-12 in about 10000 recombination crossings showed that about 54% of the T1 + Str − r recombinations, and 51% of the M + Str − r recombinations were not viable, and that the lengths of segments o-S1A, S1A-P, and P-T1 were about 34.9, 8.3, and 33.9 units of recombination, respectively. The importance of the effect of the fragmented edge on length estimations in recombination units of short segments is pointed out. G.G.

N65-25614 Joint Publications Research Service, Washington, D. C.

THE RELATIONSHIP BETWEEN THE RATE OF CHROMOSOMAL ABERRATIONS AND INTENSITY OF IRRADIATION AND HUMIDITY OF SEEDS

N. I. Nuzhdin and K. A. Filev *In its* Soviet Res. on Genet. and Physiol. 8 Jun. 1965 p 13-17 refs (See N65-25611 15-04) CFSTI: $1.00

The influence of intense irradiation on the rate of chromosomal aberrations following irradiation of barley seeds of varying degrees of humidity is discussed. Humidity was determined prior to irradiation of the seeds, which afterwards were soaked, together with controls, for 3 hrs past exposure and then set to sprout. Percentage counts of the anaphase and early telophase of the first mitotic division in the root cells, determined the radiation effectiveness. It was found: (1) Different intensities of equal irradiation dosage led to different production rates of chromosomal aberrations. (2) Manifestations of the effect of the dose strength were not related to the degree of humidity of the irradiated seeds. (3) Irradiated seeds of lower humidity had a lower percentage of aberrations caused by the radiobiological effect. Humidity and irradiation intensities influenced the type of aberration formed, with a more pronounced increase of cells with fragments at high radiation intensity and humidity, and prevalence of cells with bridges at low radiation intensity and the same humidity range. G.G.

N65-25615 Joint Publications Research Service, Washington, D. C.

CHANGES IN THE MACROSTRUCTURE OF BLOOD PROTEINS DURING EXCITATION OF THE CENTRAL NERVOUS SYSTEM

A. F. Makarchenko, B. A. Roytrub, and R. S. Zlatin *In its* Soviet Res. on Genet. and Physiol. 8 Jun. 1965 p 18-23 refs (See N65-25611 15-04) CFSTI: $1.00

The macrostructure of blood proteins was studied on 6 dogs before and after excitation by 0.5 to 1 gr caffeine per animal. A definite relationship was established between the changes in the functional state of the central nervous system and the macrostructure of peripheral blood proteins. Maximal positive conditioned reflexes coincided with maximal changes in the different blood serum indices. Serum protein binding of adrenalin in vitro revealed a decrease in protein fixing capacity at increased excitation. It was assumed that the macrostructure changes are caused by the union of blood proteins with metabolites of central origin. G.G.

N65-25641# Army Natick Labs., Mass. Radiation Sources Branch

INDUCED RADIOACTIVITY IN FOOD AND ELECTRON STERILIZATION

Richard A. Meyer Apr. 1965 59 p refs
(FD-6; AD-613950)

A survey indicates that food irradiated with 24 MeV electrons contains less than a 5% increase in the radioactivity level over that present before irradiation. Measured amount of activity induced in various foods as a function of initial electron energy is compiled. Isomer activity has not been detected in foods even from irradiation with high energy electrons. An empirical equation was developed to predict the amount of isomer activity produced in a particular food as a function of initial electron energy and dosage. Although activity induced in cans is not a food consumption problem, it can produce a handling problem. Aluminum cans or an aluminized plastic packaging material may be the best solution. Sterilization of food with 24 MeV electrons will produce a slight increase in the activity level of the food. Such an increase is insignificant when compared to the natural activity in food or the 2 to 10 fold increase in activity by the use of certain food additives. No radioactivity is induced in foods up to around 14 MeV. Current research is aimed at determining this threshold value. Author

N65-25647# United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.

THE LOGNORMAL DISTRIBUTION AND SOME EXAMPLES OF ITS APPLICATION IN THE FIELD OF RADIATION PROTECTION

H. J. Gale Mar. 1965 30 p refs
(AERE-R-4736) HMSO: 5s

Properties of the simple log-normal distribution and methods of estimating its parameters from a set of experimental results are described with examples from the field of radiation protection. Extensions of the distribution to more complicated cases are mentioned. Discussion of relevant details of the normal distribution and of sampling theory is included. Consideration of the use of the distribution is recommended for experimental data which are asymmetrically distributed. Author

N65-25657# Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, MEDICAL DIVISION RESEARCH REPORT, YEAR ENDING 31 DECEMBER 1964

[1964] 140 p refs
(ORINS-49)

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1. CORRELATION BETWEEN KIDNEY MURAMIDASE ACTIVITY AND PLASMA IRON REMOVAL IN RATS WITH WALKER-256 CARCINOSARCOMA A. L. Kretchmar and F. V. Comas p 9–11 refs

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3. HEMATOLOGIC RESPONSES TO TOTAL-BODY IRRADIATION IN THE HUMAN BEING G. A. Andrews and M. Smyser p 13–16 (See N65-25659 15-04)

4. EFFECT OF IRRADIATION ON LIPID METABOLISM IN THE WALKER-256 TUMOR J. N. Bollinger p 16–19 refs

5. EFFECT OF VITAMIN DEFICIENCY ON THE GROWTH RATE OF THE WALKER-256 TUMOR J. N. Bollinger p 19–20

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7. LIPID CLASSES OF HEMATOPOIETIC AND FATTY BONE MARROW F. Snyder and E. A. Cress p 24–26 ref

8. LIPID METABOLISM IN FATTY AND NONFATTY BONE-MARROW FRACTIONS F. Snyder and E. A. Cress p 26–30 refs

9. EFFECT OF DIETARY FAT AND TOTAL-BODY IRRADIATION ON THE FATTY ACID COMPOSITION OF BONE-MARROW LIPIDS J. N. Bollinger p 31–33 refs

10. FATTY ACID OXIDATION IN IRRADIATED BONE-MARROW CELLS F. Snyder p 34 refs

11. RAPID ELECTRONIC RED BLOOD CELL SIZING AS AN AID IN CLINICAL DIAGNOSIS C. C. Lushbaugh and D. B. Lushbaugh p 35–39 (See N65-25660 15-04)

12. NITROGEN BALANCE IN RADIATION CHIMERAS W. H. Mc Arthur, C. C. Congdon, and A. L. Kretchmar p 40–41 ref (See N65-25661 15-04)

13. CHANGE IN THE PARTITION OF TOTAL-BODY NITROGEN IN IRRADIATION CHIMERAS A. L. Kretchmar, W. H. Mc Arthur, and C. C. Congdon p 42–43 refs (See N65-25662 15-04)

N65-25658 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

INFECTIONS IN PATIENTS EXPOSED TO TOTAL-BODY IRRADIATION

G. A. Andrews, B. W. Sitterson, and Bill M. Nelson *In its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 11–13 (See N65-25657 15-04)

Twenty-six treatments with total-body radiation, 200- to 940-R midbody air dose, were given to patients with late stages of leukemia and malignancy. Half the patients died within 8 weeks and the causes of death are indicated. Infection was the major cause of early death. Among the patients who survived, a variety of infections was encountered. The prominence of gram-negative infections and fungi is emphasized in this series. Diffuse pulmonary hemorrhage associated with infection was frequent and may be rather characteristic of irradiation injury. N.E.A.

N65-25659 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

HEMATOLOGIC RESPONSES TO TOTAL-BODY IRRADIATION IN THE HUMAN BEING

G. A. Andrews and Mary Smyser *In its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 13–16 (See N65-25657 15-04)

An attempt is made to establish typical hematological patterns for various doses of total-body irradiation in the previously normal human being. Hematological responses are shown for 100, 200, and 300 rad doses. N.E.A.

N65-25660 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

RAPID ELECTRONIC RED BLOOD CELL SIZING AS AN AID IN CLINICAL DIAGNOSIS

C. C. Lushbaugh and D. B. Lushbaugh *In its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 35–39 (See N65-25657 15-04)

Red blood cell volume studies made with an electronic cell-volume analyzer unit are presented, and operational techniques of the electronic unit are discussed. The blood pictures of 27 patients who have been studied with the described electronic method which uses high aperture currents are given. N.E.A.

N65-25661 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

NITROGEN BALANCE IN RADIATION CHIMERAS

W. H. McArthur (Knoxville Coll.), C. C. Congdon (Oak Ridge Natl. Lab.), and A. L. Kretchmar *In its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 40–41 ref (See N65-25657 15-04)

Experiments were undertaken to determine whether overall nitrogen metabolism was abnormal in irradiated mice given isologous or homologous bone marrow cells. The results indicate that nitrogen balance is positive both in animals treated with isologous marrow and in mice given homologous marrow after irradiation. Summarized data show that animals treated with isologous marrow maintain a normal rate of gain in body weight through 90 days, but retain significantly more nitrogen than normal animals. The animals given homologous marrow failed to gain weight but retained twice as much nitrogen as normal mice. N.E.A.

N65-25662 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

CHANGE IN THE PARTITION OF TOTAL-BODY NITROGEN IN IRRADIATION CHIMERAS

A. L. Kretchmar, W. H. McArthur (Knoxville Coll.), and C. C. Congdon (Oak Ridge Natl. Lab.) *In its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 42–43 refs (See N65-25657 15-04)

Tests were performed to determine if there was a shift in the distribution of body nitrogen in irradiated mice with homologous marrow grafts. Experimental data show that distribution of nitrogen is changed in homologous chimeras and that there is relatively more nitrogen in skin than in carcass, especially in animals of less than 18 g and, therefore, presumably suffering from homologous disease. The data also show that this shift can be detected early (four days) but is probably progressive. Results suggest that a major target of the graft-antihost reaction is the skin and that nitrogen is deposited in this tissue at the expense of the carcass tissues. N.E.A.

N65-25663 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

WHOLE-BODY COUNTERS

A. C. Morris, Jr., C. C. Lushbaugh, R. L. Hayes, H. Kakehi, and W. D. Gibbs *In Its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 111–122 ref (See N65-25657 15-04)

A series of three whole-body counters have been developed for clinical use and are now in operation. Developmental efforts that resulted in the completion of the low-level counter are presented, and operational procedures are given. The diagnostic-level counter is also described. Several experiments were performed to evaluate the uniformity of response and clinical usefulness of the counter, and results indicate that it will be a useful instrument for following whole-body measurements in the diagnostic dose range. It is reported that the high-level whole-body counter continues to be a useful clinical instrument. The recent incorporation of a transistorized spectrometer system has resulted in more stability and easier operation. N.E.A.

N65-25664 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

COMPUTER PROGRAM FOR CALCULATION OF RESPONSE OF DETECTOR–COLLIMATOR SYSTEMS

W. D. Gibbs *In its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 122 ref (See N65-25657 15-04)

A computer program was designed to calculate the isoresponse and volume response of a detector–collimator system. The program was written specifically for data obtained at 546 points but can be simply generalized for any number of points. This problem was run on an IBM 1620 computer. Computations and readout time required less than 30 minutes. N.E.A.

N65-25665 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

THERMOLUMINESCENT DOSIMETRY

Young Ja Lee, R. J. Cloutier, and P. Dalton *In Its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 123 ref (See N65-25657 15-04)

Thermoluminescent dosimetry is currently being used to measure the dose to patients during total-body irradiation. Tabulated results are presented to show comparison of thermoluminescent dosimetry of three patients given total-body irradiation with ionization chamber measurement of an anthropomorphic irradiated phantom. N.E.A.

N65-25666 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

THE WHOLE-BODY SCANNER

A. C. Morris, Jr. *In its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 124–126 ref (See N65-25657 15-04)

The whole-body scanner system being developed is essentially complete. This scanner uses a 5-inch thick NaI scintillation detector mounted underneath the patient-supporting bed. The scanner permits the selection of different line spacings ranging between 1/16 inch and 1 1/16 inches, and scanning speeds ranging between zero and 40 inches/minute. The electronic system includes both multidot and photoscan recording. This system also incorporates a selection of separate dot factors for both photoscan and multidot modes of recording. Minor modifications and additional work done on the scanner to improve its efficiency are described. N.E.A.

N65-25667 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

RADIOSENSITIVITY IN MAN: A STUDY BASED ON THERAPEUTIC AND ACCIDENTAL EXPOSURE

C. C. Lushbaugh, R. Hofstra (Oak Ridge Natl. Lab.), R. E. Roth (St. Bonaventure Coll.), and G. A. Andrews *In Its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 128–131 (See N65-25657 15-04)

The case histories of 94 patients who had received total-body irradiation in the course of therapy, or as a result of a criticality accident, were encoded and processed to determine the incidence of anorexia, nausea, and vomiting. The patients were divided into five dosage groups for which geometric mean doses of 49.6, 105.2, 300, 370.3, and 540.5 were determined. The percentage of cases in each group that showed anorexia, nausea, and vomiting are shown. Probability analyses were then done with these data to estimate the total body irradiation dose required to produce the particular response in 50% of the patients. The results are presented in tabulated form. The values are expressed as common logarithm to define the standard deviations of the estimates, and the midline air dose (roentgens), and the absorbed dose (rads) to the gastrointestinal tract.

These results appear to indicate that, if it is true that the chance of an astronaut in space receiving 10 rads to the abdomen is less than one in 1000, the chance that radiation-induced severe nausea and vomiting will occur is less than 1:100 000. N.E.A.

N65-25668 Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. Medical Div.

AN AUTOMATIC ZONAL SCRAPER AND SAMPLE COLLECTOR FOR RADIOASSAY OF THIN-LAYER CHROMATOGRAMS

F. Snyder, H. E. Kimble, and N. Stephens *In its* Oak Ridge Inst. of Nucl. Studies, Med. Div. Res. Rept., Year Ending 31 Dec. 1964 [1964] p 133–135 refs (See X65-25657 15-04)

A scraper-collector is described for zonal radioscanning of thin-layer chromatoplates capable of removing 1-, 2-, or 5-mm zones. Operational techniques are presented, and a graph of zonal scan of I-triolein before and after purification by thin-layer chromatography is shown. N.E.A.

N65-25669# Joint Publications Research Service, Washington, D. C.

SOVIET RESEARCH ON CARDIOLOGY

8 Jun. 1965 34 p refs Transl. into ENGLISH from Kardiologiya (Moscow), v. 5, no. 2, Mar.–Apr. 1965 p 3–21, 84–85 (JPRS-30490; TT-65-31201) CFSTI: $2.00

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N65-25670 Joint Publications Research Service, Washington, D. C.

CLINICO-INSTRUMENTAL INVESTIGATION OF THE CONTRACTILE FUNCTION OF THE HEART

P. Ye. Lukomskiy *In its* Soviet Res. on Cardiology 8 Jun. 1965 p 1–13 ref (See N65-25669 15-04) CFSTI: $2.00

A brief description of the different methods and instrumentation used in clinical diagnosis of conditions of the myocardium is given. Specifically discussed are the principles and usefulness of the following methods used in assessing the pathological condition of the myocardium: (1) electrocardiography; (2) vectorcardiography; (3) phonocardiography; (4) electrokymography; (5) ballistocardiography; and (6) dilution methods (dye and radioisotope). N.E.A.

N65-25671 Joint Publications Research Service, Washington, D. C.

THE VALUE OF ELECTROKYMOGRAPHY IN THE DIAGNOSIS OF MITRAL DISEASE COMPLICATED BY FIBRILLATION

M. N. Tumanovskiy, N. M. Shestakov, and V. Ya. Garmash *In its* Soviet Res. on Cardiology 8 Jun. 1965 p 14–19 refs (See N65-25669 15-04) CFSTI: $2.00

Electrokymography is a valuable method for the diagnosis of mitral disease complicated by fibrillation. In case of markedly pronounced stenosis of the left atrioventricular orifice complicated by fibrillation, the left auricular electrokymogram records a straight or undulant line without a periodic pattern. In mild stenosis of the left atrioventricular orifice, the electrokymogram shows a periodic drop of the curve during diastole. Complex mitral disease with equally pronounced stenosis and insufficiency associated with fibrillation cause a small regurgitation notch beginning at the start of the phase of rapid expulsion and sloping decline of the curve during diastole in the electrokymogram of the left auricle. In case of complex mitral disease with prevalence of insufficiency of the mitral valve, associated with fibrillation, the electrokymogram of the left auricle shows a marked regurgitation notch beginning at the end of the phase of isometric tension and marked drop of the curve to the initial line during diastole. N.E.A.

N65-25672 Joint Publications Research Service, Washington, D. C.

THE DYNAMICS OF CARDIAL INSUFFICIENCY IN MITRAL HEART DISEASE ACCORDING TO DATA FROM VENOUS CATHETERIZATION, PUNCTURE OF CARDIAC CAVITIES, FILTRATION PHONOCARDIOGRAPHY AND ELECTROMAGNETIC BALLISTOCARDIOGRAPHY

L. T. Malaya, A. A. Shalimov, S. A. Dushanin, and M. M. Lyashchenko *In its* Soviet Res. on Cardiology 8 Jun. 1965 p 20–27 refs (See N65-25669 15-04) CFSTI: $2.00

A correlation is observed between indices of intracardiac hemodynamics and changes recorded in phonocardiogram (PKG) and electromagnetic ballistocardiogram (BKG). The relationship between the changes in the intracardiac hemodynamics and changes in PKG and BKG in cases of incipient cardiac decompensation (grade 2A) and cases of progression of cardiac decompensation (grade 2B) is described. It is shown that a relationship also exists when cardiac decompensation shifts from grade 2A to 2B. N.E.A.

N65-25673 Joint Publications Research Service, Washington, D. C.

THE ELECTROOSCILLOGRAPHIC TECHNIQUE

I. M. Kakhnovskiy and N. S. Ul'mer *In its* Soviet Res. on Cardiology 8 Jun. 1965 p 28–31 (See N65-25669 15-04) CFSTI: $2.00

A proposed system of recording electrooscillograms is presented. The system consisted of a modified two-channel, ink-scribing electrocardiograph with an additional attachment for recording electrooscillograms. A description of the proposed system and its advantages are presented. Comparative recordings of an electrooscillogram and an oscillogram are shown. N.E.A.

N65-25675# Douglas Aircraft Co., Inc., Long Beach, Calif. Aircraft Div.

AN INVESTIGATION OF LIGHTING IN DISPLAYS WITH SUPERIMPOSED FIELDS WHILE AT LOW LEVELS OF ILLUMINATION

Richard F. Gabriel, Leon R. Uyeda, and Alan A. Burrows Feb. 1965 62 p refs

(Contract Nonr-4348(00))

(AD-613344)

A study was performed to determine which of several alternate lighting configurations resulted in the best dual field performance. Both red and white light were used. The concept of pulsed or intermittent lighting was investigated. Based on Wald's two route theory of rhodopsin regeneration, it was hypothesized that pulsed light might maintain a high level of

dark adaptation for the ambient field while providing satisfactory performance on the superimposed display information. A three-dimensional factorial experimental design allowed the simultaneous evaluation of the intermittency and lighting variable. The task involved performing a continuous compensatory tracking task while simultaneously performing an alphanumeric detection-recognition task on moving elements. Results supported the use of white light, at least for the luminance levels used in this experiment (1.0 FT-L for tracking task; 0.005 FT-L for detection-recognition task). Pulsed white light at a high light-dark ratio and high interruption frequency resulted in performance on a level with that obtained with continuous white light and superior in every instance to that obtained with red light. Author

N65-25722# Joint Publications Research Service, Washington, D. C.
MICROBIOLOGICAL SYNTHESIS IN INDUSTRY AND PROTEIN BIOSYNTHESIS
8 Jun. 1965 42 p Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (Moscow), no. 4, Apr. 1965
(JPRS-30486; TT-65-31197) CFSTI: $2.00

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1. THEORETICAL AND INDUSTRIAL ASPECTS OF MICROBIOLOGICAL SYNTHESIS N. D. Iyerusalimskiy p 1-12 (See N65-25723 15-04)
2. THE PROBLEM OF PROTEIN BIOSYNTHESIS A. S. Spirin p 13-39 (See N65-25724 15-04)

N65-25723 Joint Publications Research Service, Washington, D. C.
THEORETICAL AND INDUSTRIAL ASPECTS OF MICROBIOLOGICAL SYNTHESIS
N. D. Iyerusalimskiy *In Its* Microbiological Syn. in Ind. and Protein Biosyn. 8 Jun. 1965 p 1-12 (See N65-25722 15-04) CFSTI: $2.00

The synthesizing activities of microorganisms that have practical usage or theoretical application in the industrial synthesis of products are discussed. Industries employ the microbiological method (when applicable) to the production of expensive products when chemical methods of synthesis exceed those of microorganism synthesis, in cases where the microorganism synthesized products can be used without purification or isolation, and when synthesis of certain products is inaccessible to modern chemical technology. Other cases are cited wherein a combination of microbiological and chemical methods have industrial applications. The degree of microorganism synthesis, and the development of effective technological conditions based on profound study of microorganism physiology are discussed. The method of continuous culturing of microorganisms and the principles involved are described. Limiting factors such as enzymatic reactions and the biosynthesis of enzymes are also discussed. N.E.A.

N65-25724 Joint Publications Research Service, Washington, D. C.
THE PROBLEM OF PROTEIN BIOSYNTHESIS
A. S. Spirin *In Its* Microbiological Syn. in Ind. and Protein Biosyn. 8 Jun. 1965 p 13-39 (See N65-25722 15-04) CFSTI: $2.00

A history of the problem of protein biosynthesis and present day concepts of protein biosynthesis are presented. A fundamental scheme of the processes involved in protein biosynthesis is given. Relative to this scheme, the following are discussed: (1) genetic coding of the information necessary for protein synthesis; (2) storage and reproduction of the coded information; (3) transmission of the coded information from DNA to the ribosomes; (5) the involvement of amino acids in protein biosynthesis; (6) synthesis of protein in the ribosomes; (7) ribosomal structure; and (8) regulatory aspects of protein biosynthesis. N.E.A.

N65-25770# Pittsburgh Univ., Pa. Engineering Psychology Lab.
INVESTIGATION OF MACHINE-ASSISTS TO OPERATOR PERFORMANCE: SIGNAL DETECTION AND TASK COMPLEXITY Final Report
Richard A. Regan and Wilson A. Judd Jan. 1964 31 p refs (Contract Nonr-624(11))
(AD-605713)

A review was made of the human engineering literature to isolate general machine-assist principles and to determine implications for application to the machine-aiding of human performance. Investigations were carried out in the general area of signal detection to study the facilitating properties of overt observing responses, artificial signals and display, and control complexity on operator performance. The effects of task complexity on decrement over time in the performance of a signal detection task were investigated. The independent variables consisted of variation in signal rate, the number of signal sources, and the complexity of the required post-detection response. Signals consisted of changes in repeatedly presented alphabetical characters. Contrary to previous investigations, detection performance was not significantly influenced by variations in task complexity. Results are discussed in terms of arousal theory and of possible performance-facilitating properties of familiar symbolic stimuli. Author

N65-25775# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RADIATION MEDICINE
A. I. Burnazyana and A. V. Lebedinskogo 23 Feb. 1965 513 p refs Transl. into ENGLISH of the book "Radiatsionnaya Meditsina" Moscow, Gos. Izd. Lit. po At. Nauke i Tekhn., 1963 p 3-372
(FTD-TT-64-1058/1+2; AD-613585)

Discussed are the following topics: *Physics and Dosimetry of Ionizing Radiation*—natural radioactivity and cosmic rays, calculations on tissue dosage, radiation emanating from the human body, metabolism of radioactive isotopes, elimination of radioactive isotopes, and other studies; *Pathophysiology of Radiation Affectations*—effects of ionizing radiation and their characteristics on the various body organs and systems; *Infection and Immunity in Irradiated Organisms*—antibody production and suppression of infections; *Toxicology of Radioactive Substances*—distribution, dynamics, and elimination of radioactive matter; *Pathologoanatomy of Radiation Affectations*—acute and chronic forms of radiation sickness, and injuries caused by radioactive substances; *Chemical Protection Against Ionizing Radiation*—primary physiochemical processes, and chemical protectors and their mechanisms; *Symptomatology and Treatment of Radiation Sickness*—therapy of acute and chronic radiation sickness; and *Acute Radiation Damage to Tissue*—therapy of radiation burns. G.G.

N65-25848# Oak Ridge National Lab., Tenn. Health Physics Div.
STOCHASTIC MODELS FOR THE DISTRIBUTION OF RADIOACTIVE MATERIAL IN A CONNECTED SYSTEM OF COMPARTMENTS
S. R. Bernard, V. R. Rao Uppuluri, and L. R. Shenton Jun. 1965 49 p refs
(Contract W-7405-ENG-26)
(ORNL-3809) CFSTI: $3.00

Simultaneous Stochastic difference equations of random vectors, such as $C_m = \Gamma_m C_{m-1}$, m = 1,2..., in which C_m represents a state of the system at the mth stage and Γ_m is a matrix with random elements, were studied. A recursive multivariate functional equation can be set up between the joint characteristic functions of the components in C_m and C_{m-1}. Expressions are derived for the means and covariances of the components of the vector C_m. A continuous model, involving the solution of a system of first order linear differential equations, is studied and solutions derived. The three-compartment model is discussd in full detail. Author

N65-25850# Michigan State Univ., East Lansing. Dept. of Biophysics

[ELECTRICAL CONDUCTIVITY OF PROTEINS IN THE SOLID STATE] Semiannual Status Report, 1 Jun.–1 Dec. 1964

Barnett Rosenberg, Michael R. Powell, Elliott Postow, Gordon Jendrasiak, and Helen Johnson [1964] 13 p

(Contract Nonr-2587(06))

(AD-614440)

Three experimental approaches are described to elucidate properties of the charge carriers in the electrical conductivity of proteins in the solid state. In the first experimental approach, an electrolysis experiment is designed to test the evolution of hydrogen in a solid state as a function of the hydration state of the protein. In the second part of this experiment, a determination of the conductivity change as a function of the protein (hemoglobin) is considered. The second experimental approach considers how the hydration state of the protein determines the magnitude of the semiconduction process. This is being tested by measuring the dielectric constant of hemoglobin crystals which have been equilibrated with water vapor at specific humidities. In the third experimental approach, the classical technique of the Hall effect is applied to proteins. N.E.A.

N65-25856# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EFFECT OF ALTITUDE ON THE ORGANISM OF FLIERS IN FLIGHT

A. Apollonov and V. Mirolyubov 7 Apr. 1965 18 p Transl. into ENGLISH from Voyenno Sanit. Delo (USSR), no. 7, 1938 p 16–24

(FTD-TT-65-259/1; AD-613584)

Effects of simulated high altitude conditions on fliers were tested and compared with the published literature. Charts were presented to show that hemoglobin and pH content in urine increase after high altitude flight. It was noted that at a rarefaction of 124 mm Hg, voice becomes very low and coarse, and cough and whistle are impossible. While abdominal pains occur at a relatively low altitude, they are not considered as significant as the pains which occur in the joints and deep tissues at higher altitudes. Data for the present study were derived from high mountain expeditions and experiments in low pressure chambers. M.W.R.

N65-25871# Joint Publications Research Service, Washington, D. C.

CHANGES IN RESPIRATION AND REFLEX EXCITABILITY OF THE RESPIRATORY CENTER IN DOGS INHALING OXYGEN

G. A. Vaksleyger 16 Jun. 1965 14 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR Im. I. M. Sechenova (Leningrad), v. 50, no. 3, Mar. 1964 p 280–287

(JPRS-30637; TT-65-31273) CFSTI: $1.00

Data indicated two phases in the effect of increased oxygen content on respiration. For two to eight minutes after inhalation, respiration became more shallow in 88% of the animals. In 82% of the cases, threshold of reflex excitability remained unchanged. The initial reaction was followed by a delayed response, whereby external respiration approximated its original form. Characteristic respiratory changes were also observed after the administration of chloral hydrate and aminazin. There was weakening of thoracic respiration while abdominal respiration remained relatively unchanged, suggesting inhibition of cerebral cortex activity. However, it was found that aminazin does not alter excitability of the respiratory or feeding centers. Experimentation was carried out in a closed chamber, with temperature and pressure constant but ventilation varied. Reflex excitability of the respiratory center was determined by stimulating the trunk of the vagus nerve drawn out in a skin flap on the neck. Length of stimulation was 4 to 10 sec, each stimulation lasting 3 millisec. Immediately after the threshold was determined by minimum coughing effect, oxygen was supplied, then ventilation was stopped, the chamber sealed and the CO_2 was absorbed by a CaO_2 cartridge. M.W.R.

N65-25872# Joint Publications Research Service, Washington, D. C.

NEURAL IMPULSE AND THE CHEMICAL THEORY OF MEMORY

G. Chipen 17 Jun. 1965 14 p Transl. into ENGLISH from Nauka i Tekhn. (Riga), no. 4, Apr. 1965 p 20–23

(JPRS-30676; TT-65-31289) CFSTI: $1.00

Operation of the human brain is discussed in terms of electrochemical activity on the cellular level. The nerve impulse, which is due to electrochemical potential resulting from cellular imbalance of sodium ions, is the brain's source of information about its environment. The flow of nerve impulses across the synaptic gap from one cell to another is analogous to the burning of a fuse, in which the heat of one portion ignites the next. A concept of short- and long-term memory is reviewed in which information in the form of a nerve impulse is retained as changes in the structure of the ribonucleic acid (RNA) molecule; these changes are temporary and become long-term memory only if reinforced by duplicate nerve impulses. J.M.D.

N65-25873# Commerce Dept., Washington, D. C.

CURRENT STATUS AND COMMERCIAL PROSPECTS FOR RADIATION PRESERVATION OF FOOD

Harry W. Ketchum, Jack W. Osburn, Jr., and Jerome Deitch Jan. 1965 183 p refs

(Contract AT(49-11)-2524)

(TID-21431) GPO: $0.55

The following radiation processes were applied to 28 food products: sterilization, pasteurization, disinfestation, disinfection, sprout inhibition, and product improvement. Product evaluations based on the state of technology, industry needs, estimated costs, competitive methods, consumer habits and preferences, and other related information established the following irradiation products as most promising: pasteurized poultry, marine products, and strawberries; sterilized poultry and ham; improved dehydrated vegetables; and disinfected eggs, liquid, frozen, and dried. Also discussed are areas of potential economic impact of food irradiation, and legal and consumer acceptance of irradiated food. G.G.

N65-25876# Joint Publications Research Service, Washington, D. C.

THE POSSIBILITY OF INHIBITING AND STOPPING BLOOD FLOW BY A MAGNETIC FIELD

L. Ye Belousova 16 Jun. 1965 5 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 10, no. 2, 1965 p 365–366

(JPRS-30635; TT-65-31271) CFSTI: $1.00

The physical aspect of the effect of a magnetic field on blood flow connected with the movement of a fluid having electrical conductivity and viscosity in a transverse magnetic field is examined. Using the Hartmann number M, estimates of the magnetic field which may produce an appreciable reduction in the rate of blood and its stoppage are given. Investigations of the effect of a constant magnetic field on a living organism indicate that the greatest effect of the field is exerted on the vascular system. The absence of morphological changes in the vascular walls of cardiovascular patients subjected to a magnetic field suggest that the magnetic field indirectly affects the vascular system. A qualitative agreement exists between the inhibiting effect of a magnetic field on blood flow, and the movement of an electrical conducting fluid through a rigid tube. N.E.A.

N65-25879# Department of Agriculture, Washington, D. C. Economic Research Service

RADIATION: PASTEURIZING FRESH STRAWBERRIES AND OTHER FRESH FRUITS AND VEGETABLES

Washington, AEC, Mar. 1965 28 p refs
(Contract AT(49-11)-2085)
(TID-21628) CFSTI: $2.00

The economic feasibility of pasteurizing selected produce commodities by ionizing radiation is discussed. A comparison of the preliminary estimates of radiation-pasteurizing costs with estimates of some important benefits which may result from this new method of food preservation is given. A brief discussion of the potential impact of radiation-pasteurizing on produce market structure, conduct, and performance is presented. N.E.A.

N65-25882# Federal Radiation Council, Washington, D. C.

BACKGROUND MATERIAL FOR THE DEVELOPMENT OF RADIATION PROTECTION STANDARDS. PROTECTIVE ACTION GUIDES FOR STRONTIUM-89, STRONTIUM-90, AND CESIUM-137

May 1965 53 p
(Rept.-7) GPO: $0.30

This report provides information and guidance for actions appropriate to situations involving contamination of the environment by the radionuclides strontium-89, strontium-90, and cesium-137. Two conditions of environmental contamination have been examined: an acute localized contaminating event in which prompt action may be necessary to avoid the exposure that would otherwise result; and a widespread, generally increasing, low-level of contamination (from stratospheric fallout) that causes a continuous intake of radioactive materials by large numbers of people for a period of years. Special consideration has been given to the situation in the arctic region where, because of unusual ecological conditions and food chains, some population groups are exposed to levels higher than those in other parts of the United States. Author

N65-25895# School of Aviation Medicine, Randolph AFB, Tex. Psychology Section

LECTURES IN AEROSPACE MEDICINE. EXPERIMENTAL APPROACHES TO THE PSYCHOPHYSIOLOGICAL PROBLEM OF MANNED SPACE FLIGHT

Bryce O. Hartman [1964] 44 p refs
(AD-612636)

Presented is a description of three major areas of research conducted under the psychophysiological program at the School of Aviation Medicine, which focus on the psychobiological aspects of weightlessness; the maintenance of psychomotor proficiency in the simulated space cabin environment for prolonged periods of time; evaluating gross changes in dynamic behavior in the space cabin resulting from space flight, and evaluating any aberrant behavior which might occur during the flight. Demonstrated are various combinations of physical and environmental stressors which yield an area within which man as a biological specimen survives and functions; and which illustrate the organizing concepts of space scientists, and the role of psychophysiology in the problem of space medicine. S.C.W.

N65-25905# Berkeley Inst. of Psychological Research, San Francisco, Calif.

BEHAVIORAL RESEARCH DURING THE 1963 AMERICAN MOUNT EVEREST EXPEDITION; CORRELATES OF FIELD BEHAVIOR

James T. Lester, Jr. Mar. 1965 74 p refs
(Contract Nonr-4672(00))
(TR-1; AD-613058)

The report summarizes one aspect of the behavioral research done on the 1963 American Mt. Everest Expedition, viz., the correlation between certain criterion variables (field-behavior) and pre-expedition personality assessment results. Section II explores the nature of the criterion variables; section III presents and discusses the assessment correlates. It appears that the responses of subjects on assessment techniques were valid samples of certain kinds of behavior which were later to be seen in the field, and which carried weight in the sociometric nominations used as criteria. The personological implications from all sources of data reported on show a high degree of congruence, which is encouraging with regard to the goal of developing techniques for predicting interpersonal performance in extreme environments. Author

N65-25924# Army Research Inst. of Environmental Medicine, Natick, Mass.

THE ARCTIC SOLDIER: POSSIBLE RESEARCH SOLUTIONS FOR HIS PROTECTION

Ralph F. Goldman [1962] 23 p refs
(AD-613189)

For protecting the extremities of the inactive man in extremely cold environments, a seven-pound prototype auxiliary heater, with a snap-acting thermostat, was developed. This consists of a 12-volt battery with 11 silver cadmium, 10 amp, rechargeable cells fabricated into a canvas vest. The 120-watt hour system can provide protection up to 8 hr at −40° F with a 3 mph wind; addition of greater watt-hour capacities can offer protection to −65° F with a 10 mph wind and a 2400 windchill. These auxiliary foot and handwarmers can be used with any 12- or 24-volt ac or dc power source, thus eliminating the battery supply and cutting the weight and cost of the present system by over 90%. The new approach could be applied to the development of new torso clothing, since auxiliary heating could reduce overheating during exercise and avoid after-exercise chill. M.W.R.

N65-25925*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PILOT-VEHICLE SYSTEM SIMULATION FOR LOW-ALTITUDE, HIGH-SPEED FLIGHT

Melvin Sadoff and Thomas E. Wempe Washington, NASA, Jun. 1965 51 p refs Presented at AGARD Interpanel Meeting on Low-Altitude, High-Speed Flight, Paris, 20-23 Oct. 1964
(NASA-TN-D-2793) CFSTI: HC $3.00/MF $0.50 CSCL 05H

Piloted simulator studies were made in areas where additional research appeared desirable. The vehicle simulated had

variable wing sweep and was capable of supersonic speed at low altitude. The utility of the piloted flight simulator for examining and evaluating anticipated problem areas for the low altitude, supersonic speed penetration mission is indicated. Information is presented on handling qualities and stability augmentation system requirements; display and control requirements; and on the effects of cockpit acceleration environment, including an oscillatory component, assumed to approximate a predominant structural mode, on terrain-following task performance. Author

N65-25943# North Carolina Univ., Chapel Hill. Psychometric Lab.

DECISION-THEORETIC AND EMPIRICAL INVESTIGATION OF SOME PROBABILISTIC DISCRIMINATION LEARNING SITUATIONS

Raymond A. Wiesen Bedford, Mass., AFSC, Electron. Systems Div. Jan. 1964 115 p refs

(Contract AF 19(628)-1610)

(ESD-TDR-64-192; AD-614682)

A decision-theoretic analysis and experiment of three related choice situations is presented. The first situation is a standard probabilistic discrimination learning task. Each trial begins with the presentation of one of a set of stimuli. The subject must choose between two response alternatives to predict which of two events will occur on the trial, the probability of each event being a function of the stimulus presented. The second situation arises when the conditional probabilities, i.e., the probabilities of the stimuli given the events, are introduced to the subject at the beginning of the experiment. The third situation is like the second except for the fact that the subject is not told which event occurs on each trial. The decision-theoretic analysis shows what differences in performance would be expected among the three conditions when a strategy which maximizes average expected payoff is employed. One group of subjects was run in each situation with the overall relative frequency of one event equal to .80. The performance of the subjects in the first and second situations was virtually identical, while the performance of the subjects in the third (non-feedback) was somewhat worse. The performance measure was the sum of the differences between the objective expected payoff of the optimal choices and the choices made by the subject. Comparisons of the choice proportions for the first and second groups indicated that subjects in the second group did not integrate information concerning the overall relative frequencies of events and conditional probabilities. A large proportion of subjects in the third (non-feedback) group made every choice in agreement with the assumption that the overall relative frequency of one event was one-half. Author

N65-25935# Production Group, United Kingdom Atomic Energy Authority, Annon (Scotland).

HEALTH AND SAFETY RESEARCH AT CHAPELCROSS Annual Report 1964

J H Martin 1965 8 p refs

(PG-647(CC))

A series of research projects are presented and include biological indicators of radiation exposure, means for removing radionuclides and toxic substances from the body, Solway firth investigations, pond water studies, neutron dosimetry, low level counting, film badge behavior, particulate activity in reactor gas circuits, and studies on noise effects. R.N.A.

N65-25972*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PRELIMINARY STUDY OF THE USE OF A MOMENTUM TRANSDUCER TO MEASURE THE HEART BEAT OF AVIAN EMBRYOS

Vernon L. Rogallo [1965] 17 p

(NASA-TM-X-54041) CFSTI: HC $1.00/MF $0.50 CSCL 6B

A new ultrasensitive momentum transducer has been successfully adapted as a ballistocardiograph to measure the heart beat of avian embryos. Experiments at Ames Research Center have demonstrated that life can be detected as early as 4 days in the incubation period and monitored to maturity without damage to the avian embryo. Changes in heart-beat rate and intensity resulting from temperature changes or other external stimuli were readily detected by the instrument. The technique appears to open new avenues of investigation for application in such areas as vaccine production and drug research. Author

N65-26003# Arizona Univ., Tucson. Sensory Systems Lab.

NERVE CODING STUDIES. PHASE II: INSTRUMENTATION Final Report

Glen F. Ingle and Howard A. Baldwin 1 Jan. 1965 35 p refs

(Contract DA-49-092-ARO-28)

(AD-612908)

Several solid state ultrasonic transmitting instruments for observing physiological variables in untethered animals and for monitoring environmental factors are described. The application of these ultrasonic devices to the telemetry of the electrocardiogram, body temperature, and diving depth are discussed. Circuit descriptions are presented for a 50 Kc ultrasound FM receiver, an underwater radiofrequency transmitter, a high input impedance circuit for nerve pulse detection, and an implanted radiofrequency transmitter for accurate temperature telemetry. R.N.A.

N65-26034# Joint Publications Research Service, Washington, D. C.

AN EXPERIMENTAL STUDY OF POLYDISPERSE BACTERIAL AEROSOLS. III: A STUDY OF DIPHTHERIA BACILLUS AEROSOLS

V. P. Zhalko-Titarenko 8 Jun. 1965 9 p Transl. into ENGLISH from Zh. Mikrobiol. Epidemiol. i Immunobiol. (Moscow), no. 2, Feb. 1965 p 66–73

(JPRS-30503; TT-65-31214) CFSTI: $1.00

Study of the survival time of diphtheria microbes in an aerosol (starting from the 3rd minute after dispersion and continuing for 120 minutes) revealed that it was dependent on the evaporation of water. In drops with slow evaporation (saliva), it was higher than in rapidly evaporating water particles. The microbes died very rapidly in an aerosol at 35°, but all remained viable at subzero temperatures. The survival time was longer when the large particles in the aerosol were more numerous, but decreased in small-drop fractions. Author

N65-26065*# Michigan State Univ., East Lansing.

THE EFFECTS OF WEIGHTLESSNESS AND OTHER STRESSES ASSOCIATED WITH FLIGHT IN SPACE ON PATHOGENICITY AND IMMUNITY Final Report

[1964] 25 p

(Grant NsG-514)

(NASA-CR-63282) CFSTI: HC $1.00/MF $0.50 CSCL 06S

Plasmodium berghei infections of mice were studied to determine the feasibility of using this infection for immunity studies and pathogenesis of mice during space flight. Infected mice lost their ability to maintain normal body temperatures and consumed considerably less oxygen than uninfected animals; pagocytic activity by cells in the liver, spleen, and bone marrow could be demonstrated by radioiron. Treatment of the infection controlled the anemia and increased the erythropoietic activity. It was concluded that this infection experiment could be used on mice in conditions of reduced gravity to observe the effects on the erythropoietic activity. Also presented is the design for a mouse chamber suitable for housing and feeding of five mice for two weeks. G.G.

N65-26109# North Carolina Univ., Chapel Hill. Psychometric Lab.

SEQUENTIAL INFORMATION SEEKING: AN OPTIMAL STRATEGY AND OTHER RESULTS

David M. Messick Bedford, Mass., AFSC, Electron. Systems Div., Oct. 1964 16 p refs

(Contract AF 19(628)-1610)

(ESD-TDR-64-605; AD-614685)

This paper presents an optimal strategy for sequential sampling from binomial distributions. The strategy presented is general in that it is a "multi-action" rather than a two-action procedure. While the major task is to estimate the proportion, p, of "successes" in a hypothetical, infinite population of binary observations, it is assumed that the decision maker is only concerned with which of a set of mutually exclusive and exhaustive subsets of the unit interval contains p. The derived strategy maximizes the decision-maker's gain without regard to error probabilities. The important variable in determining a rule for ceasing to look at new data and making a decision is found to be the expected probability of being correct. The criterion involves only the economic aspects of the situation. A "no information" theorem is presented which shows that under some circumstances when a "success" or a "failure" on a given trial are equally probable, the probability of being correct after making the observation is identical to the probability of being correct before the observation was taken. Finally, an appealing derivation of the Beta-binomial probability function is given which suggests a more tractable computational procedure for the distribution and which illuminates its limiting distribution. Author

N65-26118# Bunker-Ramo Corp., Canoga Park, Calif.

HUMAN ENGINEERING: PILOT FACTORS PROGRAM Final Summary Report, 1 Oct. 1964–31 Jan. 1965

A. C. Mc Tee and W. F. Swartz Feb. 1965 20 p

(Contract AF 33(615)-2214)

(AD-612726)

The work reported in this study represents a portion of the continuing effort to define the pilot factors essential to successful all-weather landing. The program is described in three general activity areas, which are called respectively the T-39, T-29, and Consulting areas. These areas are characterized by a common plane of approach: technical direction and furnishing of project equipment by the Lear-Siegler engineering support group; development of instrument flying procedures and inflight conduct of studies by the Instrument Evaluation Section; and development of measurement techniques, data, collection, reduction, and analysis by the Bunker-Ramo support group. Each of the three problem areas, T-39, T-29, and Consulting, is discussed as an entity with the problems and progress of the individual area placed in context. N.E.A.

N65-26121# North Carolina Univ., Chapel Hill. Psychometric Lab.

SEQUENTIAL INFORMATION SEEKING: EFFECTS OF THE NUMBER OF TERMINAL ACTS AND PRIOR INFORMATION

David M. Messick Bedford, Mass., AFSC, Electron. Systems Div., Oct. 1964 15 p refs

(Contract AF 19(628)-1610)

(ESD-TDR-64-606; AD-614708)

An experiment was conducted by means of a digital computer in which 54 human *Ss* were faced with the task of sampling from a hypothetical binomial universe in which a proportion, p, of all observations were "top quality." *Ss* sampled the universe sequentially, stopping after some number of observations had been made to make a terminal decision by selecting the one of the *S*'s mutually exclusive and exhaustive subsets of the unit interval which *S* believed contained p. The four experimental treatments were defined by the four combinations of the two decision partitions of the unit interval, one involving 3 possible terminal acts, the other having 5 alternatives, and the two ar distribution Analysis of variance of the number of predecision observations taken indicated a) significant individual differences; b) significant *S* by treatment interactions; c) differences attributable to the decision partitions with more observations being taken in the 5-act case than in the 3-act case; and d) no effect of prior frequency distributions, but a tendency to take more observations in the second 16 trials than in the first 16. Author

N65-26128# Joint Publications Research Service, Washington, D. C.

DISCUSSION OF L. A. MILYUTIN'S ARTICLE "A POSSIBLE MECHANISM OF ELECTRICAL ASSYMETRY OF TISSUES"

K. V. Yakimchuk 16 Jun. 1965 5 p refs Transl. into ENGLISH from Biofizika (Moscow), v. X, no. 2, 1965 p 386–387 (JPRS-30634; TT-65-31270) CFSTI: $1.00

The author relates the occurrence of geometrical bio-potentials in animal and plant tissues to the presence of a weak electronic conductivity. The important role of conductors in the development of electromotive forces is demonstrated by the non-uniform diffusion of ions from two drops of electrolyte solution on a moist circular paper, where one of the drops is placed in the center and the other near the rim of the circle. The removal of cations from both drops and the difference in anion concentrations will produce an electrical potential of 80 to 90 millivolts. G.G.

N65-26129# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

STUDY OF MONKEY, APE, AND HUMAN MORPHOLOGY AND PHYSIOLOGY RELATING TO STRENGTH AND ENDURANCE. PHASE V: THE MUSCULOSKELETAL ANATOMY OF THE ANTEBRACHIUM OF AN ADULT FEMALE CHIMPANZEE

William E. Edwards Apr. 1965 48 p refs

(ARL-TR-65-4; AD-462434)

The left antebrachial musculature of a young-adult female chimpanzee is described and illustrated with the accuracy of detail plus clarity made possible by the photo-etching process. Other data are depicted graphically by section drawings. Comparisons with data from the literature on other chimpanzees, apes, humans, and non-hominoid primates are also provided, with emphasis on quantitative aspects. Author

N65-26142# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE INFLUENCE OF CERTAIN PHARMACOLOGICAL PREPARATIONS ON THE BIOELECTRIC ACTIVITY OF THE BRAIN IN SCHIZOPHRENIA

A. L. Gamburg and A. M. Denisova 20 Apr. 1965 18 p refs Transl. into ENGLISH from Zh. Nevropatol. i Psikhiatr. (Moscow), v. 64, no. 1, 1964 p 116–124

(FTD-TT-65-388/1+2; AD-614403)

Utilizing 51 schizophrenic patients and 9 normal subjects, studies were conducted on modifications of the bioelectric activity of the brain in the course of pharmacological tests. By means of EEG indications, some troubles of basic activity were proved with certain patients, and also the character of response to doses of extraordinary excitants. Modifications of biopotentials after the injection of adrenalin, acetylcholine or atropine into the patients were very different than those observed with the normal subjects. At the same time, adrenalin and atropine

as well as corticotropine, cortisone, desoicortisone or thyreoidine, eliminate in a selective manner, certain pathological elements of the EEG in certain forms of schizophrenia. Acetylcholine caused evident pathological modifications in the EEG. One such effect of the medications used has been partially explained by their influence on the adrenergic and cholinergic systems. The results of the research, according to the authors, can facilitate the analysis of pathogenic mechanisms and the research for means of normalization of the reaction of cerebral structures in schizophrenia. Author

N65-26145# Naval Ordnance Test Station, China Lake, Calif. Aviation Ordnance Dept.
VISUAL DETECTION OF TARGETS: ANALYSIS AND REVIEW
Ronald A. Erickson Feb. 1965 65 p refs
(NOTS-TP-3645; NAVWEPS-8617; AD-612721)

This report discusses many of the aspects of air-to-ground visual search for targets. Curves are presented that can be used for estimating the probability that a ground target is within view and for determining the angular rate of the target as measured with respect to the air observer. Optical aspects (clouds, atmospheric attenuation, reflectance factors) of visual detection are discussed briefly and references from which data can be obtained are cited. A number of laboratory experiments concerning visual detection are described, and some of the results are given. Examples of simulation, operational, and mathematical methods of obtaining estimates of search performance are given and compared. Author

N65-26221# Joint Publications Research Service, Washington, D. C.
CYBERNETICS IN MOLECULAR BIOLOGY AND IN THE THEORY OF PERCEPTION
9 Jun. 1965 36 p refs Transl. into ENGLISH from Deut. Z. für Philosophie (Berlin), no. 3, 1965
(JPRS-30523; TT-65-31221) CFSTI: $2.00

CONTENTS:
1. CYBERNETICS IN MOLECULAR BIOLOGY K. Fuchs-Kittowski p 1-28 refs (See N65-26222 15-04)
2. ON THE SIGNIFICANCE OF THE THEORY OF PERCEPTION IN NEUROCYBERNETICS G. Klaus p 29-33 refs (See N65-26223 15-04)

N65-26222 Joint Publications Research Service, Washington, D. C.
CYBERNETICS IN MOLECULAR BIOLOGY
Klaus Fuchs-Kittowski *In its* Cybernetics in Mol. Biol. and in the Theory of Perception 9 Jun. 1965 p 1-28 refs (See N65-26221 15-04) CFSTI: $2.00

The discussion presented is based essentially on an inquiry into three problems: 1. The significance of systems of regulation of cellular metabolism in regard to the adaptability of the individual cell; 2. A series of viewpoints in the discussion on the dialectic-materialistic concept of determinism in biology; 3. The dialectic relation of automaton and life and in connection with this, the dialectic relation of preformation and epigenesis. Author

N65-26223 Joint Publications Research Service, Washington, D. C.
ON THE SIGNIFICANCE OF THE THEORY OF PERCEPTION IN NEUROCYBERNETICS
George Klaus *In its* Cybernetics in Mol. Biol. and in the Theory of Perception 9 Jun. 1965 p 29-33 refs (See N65-26221 15-04) CFSTI: $2.00

A discussion on neurocybernetics concludes that this new discipline within the science of cybernetics is applicable to medicine, education, and psychology, and the theory of perception. It suggests that the proposed hypothesis of three stages which regulate and control the organism could change present concepts of human perception. This hypothesis holds that nonconditioned and conditioned reflexes are elementary algorithms constituted by stimuli and responses; and that these algorithms are replaced by chains and, eventually, nets of algorithms. In addition to this system, referred to as the algorithms of behavior, a system of meta-algorithms, concerned with the formation of the first, is evolved. This second set is superposed by a third set of meta-meta-algorithms. It is suggested that the three systems present an analogy to logic. Further discussion concludes that modern medicine requires a radical change in the formation of theory and in general methodology rather than more extensive factual materials and new experimentation. M.W.R.

N65-26228# Library of Congress, Washington, D. C. Aerospace Technology Div.
A.T.D. PRESS SPECIAL EXPRESS ISSUE, VOLUME 3, NO. 243
14 Jun. 1965 20 p refs Abstracts of two Soviet Articles on Manned Space Flight

CONTENTS:
1. SPACE-ORIENTED ECOPHYSIOLOGY IN THE USSR p 1-8 refs (See N65-26229 15-04)
2. PHYSIOLOGICAL EFFECTS OF GRAVITATION p 9-17 refs (See N65-26230 15-04)

N65-26229 Library of Congress, Washington, D. C. Aerospace Technology Div.
SPACE-ORIENTED ECOPHYSIOLOGY IN THE USSR
In its A.T.D. Press Special Express Issue, Vol. 3, No. 243 14 Jun. 1965 p 1-8 refs (See N65-26228 15-04)

Ecophysiology is defined as a group of biological disciplines concerned with the vital activity and behavior of living organisms exposed to space conditions, or to space flight on rocket-propelled vehicles. Environmental conditions under study in the Soviet Union include vacuum research, cosmic and solar irradiations, effects of low temperatures, effects of acceleration, problems of weightlessness, creation of artificial atmospheres, closed ecological systems, and training and adaptation of astronauts. G.G.

N65-26230 Library of Congress, Washington, D. C. Aerospace Technology Div.
PHYSIOLOGICAL EFFECTS OF GRAVITATION
In its A.T.D. Press Special Express Issue, Vol. 3, No. 243 14 Jun. 1965 p 9-17 refs (See N65-26228 15-04)

By weightlessness induced physiological changes in the spheres of: (1) afferentation and analyzer activities, (2) motor coordination, and (3) vegetative regulation of the body functions are briefly reviewed with emphasis on data and observations from Soviet cosmonaut space flights. It was concluded that weightlessness does not spontaneously affect the physiological processes but acts through a number of adaptive, compensatory, disruptive, and inhibitory processes on the organism. Changes in receptor function and afferentation lead to illusions characterized by disorientation and spatial analysis, to inhibition of internal organ functions, disruption of the vestibular-vegetative system, discoordination of movements, and lowered work capacity. G.G.

N65-26237# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
A WIDE BAND FREQUENCY AUDITORY TEST SYSTEM FOR USE WITH PRIMATES Final Report, 1 Apr. 1962-1 Apr. 1964

Gregg A. Gilbert and Gale H. Kaplan May 1965 14 p refs
(ARL-TR-65-5; AD-463489)

Although it is generally accepted that most humans cannot hear tones above 20,000 cps, data collected using extended range techniques indicate that many animals can hear tones much higher than this. In order to verify and extend data in the area of hearing, particularly that of primates, a system was developed which allowed for auditory testing in the frequency range of 40 cps to 40,000 cps without any extraneous cues to the test subject. These frequencies were generated with either of two transducers. Tones in the range from 40 cps to 20,000 cps were generated with an electrodynamic high fidelity headphone. Tones in a range of 10,000 cps to 40,000 cps were generated by driving a small condenser microphone as a loudspeaker. Both of the transducers were driven by a precision oscillator. The voltage signal from the oscillator to a transducer was turned on or off with an electronic switch. The electronic switch eliminated any "click" that would be transmitted with the tone.

N65-26240# School of Aerospace Medicine, Brooks AFB, Tex.
THE EFFECT OF TOTAL-BODY IRRADIATION ON DNA SYNTHESIS IN RAT SPLEEN AND BONE MARROW IN VITRO Final Report
Harold L. Kundel and Donald F. Logsdon, Jr. Mar. 1965 10 p refs
(SAM-TR-65-14; AD-462953)

During the first two hours after total-body irradiation a rapid depression of DNA synthesis in rat spleen and bone marrow was found. An in vitro assay system for DNA synthesis was used. A two-component dose-response curve was found suggesting the possibility that there are two different sites of radiation damage to DNA synthesis. Author

N65-26241# School of Aerospace Medicine, Brooks AFB, Tex.
NEUTRON-INDUCED DENTAL FRAGILITY
Donald G. Willhoit, William K. Collett, and Niel Wald Mar. 1965 12 p refs
(SAM-TR-65-8; AD-462985)

After whole-body fission neutron irradiation of Sprague-Dawley rats, a high incidence of dental defects was observed at neutron doses significantly lower than those previously reported in the literature. A recurrence of the defects in subsequent developmental cycles was also noted. Disturbance of enamel formation was seen in animals exposed to 80 rads. Interference with dentin formation resulting in osteodentin and dentinal niches in the labial aspect of the incisors was observed after 125 and 170 rads. This gross macroscopic change was verified in histologic sections and radiographs. The fact that some teeth exhibiting these gross structural defects have fractured a second time supports the possibility that some degree of permanent damage is inflicted on the developing tooth germ. The fact that the niche is observed only in the incisor dentin of the labial side, as has been observed in x-ray studies, indicates that neutrons affect the teeth in a similar manner to x-rays, although neutrons seem to be four times more effective than x-rays in producing these dental defects. Author

N65-26242# School of Aerospace Medicine, Brooks AFB, Tex.
CARBON DIOXIDE, OXYGEN, AND ACIDITY: THE INTERACTION AND INDEPENDENT EFFECTS ON BREATHING OF THESE FACTORS IN THE ARTERIAL BLOOD.
Robert William Hamilton, Jr. and E. B. Brown, Jr. Dec 1964 48 p refs
(SAM-TR-64-94; AD-462984)

Experiments were conducted on pentobarbital anesthetized dogs and on trained unanesthetized dogs to determine the independence or degree of interaction among the three chemical stimuli: O_2, CO_2 and H^+ (measured in arterial blood) as respiratory stimulants. The interaction of the CO_2–H^+ complex and low oxygen, as described by others, was reconfirmed. Further dissection of this relationship indicated that the interaction is between CO_2 and O_2 and the H^+ is not involved. The interaction of CO_2 and H^+ was determined with oxygen tension held above 200 mm. Hg, at which level it is unimportant as a respiratory stimulant. It appears that the response to CO_2 decreases as the level of H^+ increases and vice versa. We interpret this as a negative interaction between these two chemical agents. Author

N65-26243# Texas A&M Research Foundation, College Station.
AMINO ACID ANALYSES OF LENSES AND VITREOUS, AND ENZYMATIC CHANGES FOLLOWING EXPOSURE TO CATARACTOGENIC AGENTS
T. M. Ferguson, J. R. Couch, and E. B. Dawson Brooks AFB, Texas, School of Aerospace Med., Oct. 1964 21 p refs
(Contract AF 41(657)-293)
(SAM-TDR-64-19; AD-457588)

The complete compilation of data from the biochemical studies of effects of various cataractogenic methods is presented. The methods include x-ray, dinitro-phenol, and dietary avitaminosis E. The amino acid concentrations in the lenses of treated turkeys and controls are presented, showing the susceptibilities at differing ages. The effects of avitaminosis E on certain turkey lens enzyme systems are also presented. Author

N65-26295# Brookhaven National Lab., Upton, N. Y.
MEDICAL SURVEY OF THE PEOPLE OF RONGELAP AND UTIRIK ISLANDS NINE AND TEN YEARS AFTER EXPOSURE TO FALLOUT RADIATION (MARCH 1963 AND MARCH 1964)
Robert A. Conard et al May 1965 171 p refs
(BNL-908(T-371)) CFSTI: $5.00

The results of a follow-up medical survey conducted 9 to 10 years after exposure to radiation fallout are presented. Initial examinations showed low levels of leukocytes and platelets of the peripheral blood in the 64 people who received 175 rads; this condition was less marked in the groups receiving less exposure. Annual hematological follow-up studies have revealed that the levels of white cells and platelets of the peripheral blood in the exposed group never reached the levels of the unexposed comparison population. Beta burns of the skin and epilation appeared about 2 weeks after exposure, mainly on parts of the body not covered by clothing. During the past several years, increased numbers of pigmented nevus-like lesions were noted in previously irradiated areas of the skin but appeared to be benign. Comparative radiochemical analyses of urine samples of the exposed and unexposed population are tabulated. A full-term still birth with congenital anomalies was born to exposed parents in 1962. A case of congenital heart defect was noted in a child born to exposed parents several years ago. Except for one ectopic pregnancy, no miscarriages were reported during this two year period. Statistics on mean blood counts, hematological findings, anthropometric studies, serum folic acid levels, and bone marrow differential counts are also included. R.W.H.

N65-26316# Youngstown Univ., Ohio. Dept. of Chemistry
INVESTIGATION OF THE USE OF BIOCHEMICALS IN TECHNIQUES OF CO_2 SEPARATION AND CONCENTRATION IN AEROSPACE VEHICLE ATMOSPHERE REGENERATION PROCESSES Quarterly Technical Report

Eugene D. Scudder et al Aug. 1964 87 p refs
(Contract AF 33(615)-1777)
(QTR-1; AD-460941)

The use of the enzyme carbonic anhydrase in controlling the absorption, storage, and release of carbon dioxide, to maintain breathing conditions in spacecrafts, was investigated experimentally. Under laboratory conditions it was found that when the enzyme is introduced into a buffer at low pressure, rapid absorption of carbon dioxide is feasible. Desorption of carbon dioxide from a buffered aqueous solution can be rapidly accomplished either by lowering the pH or by lowering the partial pressure of the carbon dioxide in contact with the solution in the presence of the enzyme. Aqueous Tris solutions were found to be good absorbents for carbon dioxide. A redox couple can effect reversible changes in the pH of dilute or moderately concentrated solutions, by means of controlled potential electrolysis, with very little gas evolution from the water. The stability of certain carbonic anhydrase preparations in buffered solutions makes the technical use of this enzyme feasible. J.M.D.

N65-26318# Mississippi State Univ., State College. Dept. of Microbiology
PHYSICAL, CHEMICAL, AND MICROBIOLOGICAL EVALUATION OF ELECTROCHEMICAL DEGRADATION OF HUMAN WASTES
Robert G. Tischer, Lewis R. Brown, and Maurice V. Kennedy Oct. 1964 75 p refs
(Contract AF 41(609)-1633)
(AD-461006)

A clear solution of salts and cellulose resulted from electrolysis of one man's daily output (100 g feces; 1500 g urine) using platinum electrodes. Only 5.76 K.W.H. were required. Substantial reductions were noted in chemical oxygen demand (75%), total solids (37%), suspended solids (56%) and Kjeldahl nitrogen (82%). Oxygen (225 1), hydrogen (486 1), carbon dioxide (56 1), nitrogen (22 1), and chlorine (none) were evolved. Several facets of the electrochemical process were elucidated, including attempts to balance chemically the elements carbon, nitrogen, chlorine, phosphorous, and sulfur. Electrolyzed daily output (EDO) employed to grow *Chlorella* 71105 (after 1:5 dilution with distilled water) yield maximum growth (3.058 g/l dry weight) 50% greater than Knop's control. A simple, miniature prototype model designed to serve as the starting point for a full scale prototype for in-space-flight testing has been described. The rate of gas production is employed to evaluate performance efficiency. Author

N65-26347# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering
AN INVESTIGATION INTO THE ROLE OF THE CORTICAL COMPUTING UNIT IN HUMAN VISUAL PATTERN RECOGNITION
Oscar Eugene Williams, Jr. (M.S. Thesis) Aug. 1964 185 p refs
(GE/EE/64-22; AD-608086)

It has been postulated that the neurons in the cerebral cortex are arranged so that the cortex is functionally a sheet of individual computing units coupled together horizontally and processing information perpendicularly through the sheet in a process described mathematically as correlation. A digital computer model is developed which simulates the proposed correlation function performed by the human visual system and is evaluated on the IBM 1620 and IBM 7094 digital computers. The computer model performs: 1) storage of a number of patterns; 2) correlation between input and stored patterns; 3) pattern translation correction; 4) pattern recognition; 5) pattern similarity recognition and short term memory simulation; 6) memory allocation. Recommendations are made for Fourier transform analysis, pivoted pattern analysis, and magnification effect correction. Author

N65-26378# Atomic Energy Commission, Washington, D. C. Div. of Technical Information
RADIOBIOLOGY
A. M. Kuzin, ed. Oak Ridge, Tenn., AEC, 1964 253 p refs Transl. into ENGLISH of Radiobiologiya (Moscow), v. 4, no. 1, 1964
(AEC-TR-6404) CFSTI: $6.00

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2. SPECTROPHOTOMETRIC EVALUATION OF RADIATION DAMAGE OF HEMOGLOBIN K. I. Pravdina p 11–22 refs (See N65-26380 15-04)
3. SOME PROBLEMS OF THE THEORY OF THE BIOLOGICAL ACTION OF FAST NEUTRONS A. M. Kuzin p 23–29 refs (See N65-26381 15-04)
4. INFLUENCE OF IONIZING RADIATION ON THE SUBMICROSCOPIC STRUCTURES OF THE STRIATED MUSCLES M. M. Gol'dshtein p 30–38 refs (See N65-26382 15-04)
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7. PARTICIPATION OF OXYGEN IN RADIATION INACTIVATION OF DRY ENZYMES E. E. Ganassi, L. Kh. Eidus, and R. A. Arifulina p 55–62
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11. STUDY OF THE "OXYGEN EFFECT" AT VARIOUS RADIATION DOSE RATES I. B. Bychkovskaya and G. K. Ochinskaya p 85–90 refs (See N65-26384 15-04)

N65-26379 Atomic Energy Commission, Washington, D. C. Div. of Technical Information
EFFECTS OF IONIZING RADIATION ON THE SYSTEM OF HYDROGEN BONDS OF DNA MACROMOLECULES
P. I. Tseitlin, G. P. Yaskevich, and N. I. Ryabchenko *In its* Radiobiology 1964 p 1–10 refs (See N65-26378 15-04) CFSTI: $6.00

The action of X-rays on the melting curves of DNA was investigated to determine the effects of ionizing radiation on the systems of hydrogen bonds in the macromolecule. Doses of X-ray irradiation, that do not influence the value of the proton energy at a wavelength of 260 millimicrons of DNA solutions at room temperature, lead to an appreciable reduction of the melting point, and to a deterioration of the melting contour when irradiation dosage is increased. The reduction of the melting point displacement of the hydrogen bonds (T_m) is linearly related to the irradiation dose. It is hypothesized that

the reduction of T_m and deterioration of the melting contour result from the presence of single cleavages in DNA, which separate the single ordered system of hydrogen bonds into a number of independent double-helical portions. The melting of these portions occurs at lower temperatures as a result of their lower molecular weight (about 100 000 and below). L.S.

N65-26380 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

SPECTROPHOTOMETRIC EVALUATION OF RADIATION DAMAGE OF HEMOGLOBIN

K. I. Pravdina *In its* Radiobiology 1964 p 11-22 refs (See N65-26378 15-04) CFSTI: $6.00

Aqueous solutions of hemoglobin in concentrations of 8-160 mg% were irradiated, and radiation damage was spectrophotometrically determined according to the increase in the extinction coefficient $K_t(500/540)$] and according to the decrease in the absorption at 578 millimicrons. At 630 millimicrons, the absorption increases markedly upon irradiation. Great sensitivity to alkaline denaturation of irradiated hemoglobin, and the presence of an oxygen effect and an oxygen aftereffect was detected. Rat and pigeon blood was used in the experiment, and it was found that pigeon hemoglobin is more radiosensitive than rat hemoglobin. L.S.

N65-26381 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

SOME PROBLEMS OF THE THEORY OF THE BIOLOGICAL ACTION OF FAST NEUTRONS

A. M. Kuzin *In its* Radiobiology 1964 p 23-29 refs (See N65-26378 15-04) CFSTI: $6.00

Data on the relative biological effectiveness (RBE) of neutron irradiation, compiled from the literature, were tabulated. An analysis indicates that when large doses which produce a rapidly appearing effect are used, the RBE of neutrons proves to be either equal to or greater than one. This seems true for the death of animals in acute experiments, for the appearance of mutations, and for long term destructive processes. Conclusions drawn from the data indicate that the significant increase in the RBE in the case of chronic influence of small doses of neutrons (and for long-term aftereffects) should be specially considered in organizing radiobiological protection for chronic irradiation conditions. The theory of the appearance of a large number of irreparable damages under the influence of neutrons was not confirmed. In the case of prolonged chronic irradiations, the increase in the RBE is believed due to the different character of the accumulation of damage in gamma and neutron irradiation. The data are also discussed in relation to the structural metabolic theory. L.S.

N65-26382 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

INFLUENCE OF IONIZING RADIATION ON THE SUBMICROSCOPIC STRUCTURES OF THE STRIATED MUSCLES

M. M. Gol'dshtein *In its* Radiobiology 1964 p 30-38 refs (See N65-26378 15-04) CFSTI: $6.00

Electrical parameters of the gastrocnemius muscle of the frog *R. temporaria* were measured before and after irradiation in order to study the changes in the submicroscopic structure. Tests on the dynamics of the muscle swelling in distilled water, and on the optical density (O.D.) of the muscles in transmitted light were also run, so that the development of radiation damage in the tissue could be determined by comparing the results with time. Results indicate that directly after an irradiation dose of 134.4 krad, the ohmic component of the impedance of the muscles at low frequencies of 1 to 100 kc/sec decreases, and that this decrease progresses with time. The ohmic component at the high frequency of 1 Mc/sec remained unchanged. The capacitive component begins to differ from the control after 20 minutes, but does not drop sharply until 2.5 hrs after irradiation. The swelling rate of the muscles in distilled water increases substantially 20 minutes after irradiation, and the optical density changes in two phases. First the O.D. decreases, but then increases with the greatest rate of O.D. growth beginning three hours after irradiation. L.S.

N65-26383 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

DEPENDENCE OF THE RADIOSENSITIZING EFFECT OF OXYGEN ON ITS CONCENTRATION AND THE LIFETIME OF FREE RADICALS

V. P. Paribok *In its* Radiobiology 1964 p 81-84 refs (See N65-26378 15-04) CFSTI: $6.00

An explanation is proposed for the dependency of the radiosensitizing action of oxygen on its concentration. In the radiation of a living cell containing a large amount of water, the short-lived free radicals that arise react with oxygen molecules only if they collide. The probability of the collision is dependent upon the lifetime of the radical, and the waiting time between two successive collisions of oxygen molecules with the same point of the radiosensitive biomolecule. If the oxygen concentration increases, the waiting time decreases. If at some oxygen concentration the waiting time is equal to the lifetime of the radical, then a further reduction of the waiting time does not influence the result of the reaction since it has already reached a maximum; but if the waiting time is increased, the reaction yield will decrease. The waiting time can be calculated if the number of collisions of oxygen molecules with a unit surface in a unit time is known; formulas for these calculations are given. L.S.

N65-26384 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

STUDY OF THE "OXYGEN EFFECT" AT VARIOUS RADIATION DOSE RATES

I. B. Bychkovskaya and G. K. Ochinskaya *In its* Radiobiology 1964 p 85-90 refs (See N65-26378 15-04) CFSTI: $6.00

Beetles *Calandra granaria* (granary weevil) were irradiated in mediums containing oxygen concentrations from 0% to 21%, for studying the oxygen effect at various radiation dose rates. The criteria of radiation action were survival of the beetles, and their average lifetimes. Results indicate that the dependency of radiation injury of weevils on the oxygen concentration in the medium at the moment of irradiation is characterized by an S-shaped curve with a sharp increase in injury at a definite oxygen concentration, and then a leveling off to an oxygen ceiling. Further increase in the oxygen concentration does not affect the radiation effect. Within a definite range of oxygen concentrations, the radiation injury of the beetles is dependent on very small changes in the oxygen concentration in the medium, and does not depend on changes in the dose rate. L.S.

N65-26385 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

TIME-EFFECT CURVES FOR THE IRRADIATION OF DORMANT SEEDS WITH VARIOUS MOISTURE CONTENTS

N. A. Poryadkova *In its* Radiobiology 1964 p 91-97 refs (See N65-26378 15-04) CFSTI: $6.00

Dormant seeds of peas with moisture contents of 9% and 18% were irradiated to determine whether the moisture content influences the amount of primary injuries or the development of the radiation injury with time. A comparison of the time-effect curves indicates that the initial stage of injury in both is the same, but that the decrease in the number of damaged cells occurs more rapidly in seeds with 18% moisture content. This appears to confirm that the moisture content of

dormant seeds does not influence the number of potential cytogenetic damages that arise during irradiation, but exerts a vital influence on the recovery of the cells from these injuries. L.S.

N65-26386 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

THE MODEL OF "REMOVAL OF THE EFFECTIVE DOSE" AND REACTIVATION OF CELLS IRRADIATED BY ULTRAVIOLET

E. N. Kabakov *In its* Radiobiology 1964 p 103-111 refs (See N65-26378 15-04) CFSTI: $6.00

The assumption that photoreactivation of cells subject to uv irradiation represents a gradual removal of the absorbed uv dose is analyzed to determine the validity of a mathematical model for the dynamics of photoreactivation phenomena. A comparative analysis of the ratio of forms of inactivation in uv irradiation of a yeast population and its post-radiation recovery, indicate that photoreactivation can be described in terms of removal of the effective dose. In the case of dark recovery, the model is formally applicable, but does not reflect the essence of the process. L.S.

N65-26387 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

ON THE PERIODS OF REALIZATION OF POTENTIAL RADIATION INJURIES IN DIPLOID YEAST CELLS

V. I. Korogodin *In its* Radiobiology 1964 p 112-125 refs (See N65-26378 15-04) CFSTI: $6.00

Diploid yeasts were irradiated, placed under conditions favorable for budding, and were then transferred to a nonnutritive medium after various periods of time. The fraction of budding individuals and the fraction of cells capable of recovery were determined, and the two indices were compared for potential radiation injuries in the yeast cells. Comparison of the results with similar experiments on plants and paramecia indicate that the realization of potential radiation injuries, responsible for the death of irradiated yeast cells after one or several cycles of multiplication, occurs during the same period of the life cycle of the irradiated individual as in the case of the realization of potential injuries producing chromosomal aberrations in plant cells, or recessive lethal mutations in the micronuclei of paramecia. It is suggested that the mechanism of such realization is identical in all three cases. L.S.

N65-26388 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

RADIOSENSITIVITY OF THE UNICELLULAR ALGA *CHLORELLA VULGARIS*

I. A. Zakharov and V. V. Tugarinov *In its* Radiobiology 1964 p 126-130 refs (See N65-26378 15-04) CFSTI: $6.00

A suspension of unicellular alga *Chlorella vulgaris* culture in water, was irradiated, and its radiosensitivity to various X-ray doses was studied. A multi-hit inactivation curve was obtained for cell survival vs dose. It was found that the semilethal dose for *Chlorella* cells is 14.5 kr. From 16 kr to 64 kr, the frequency of pigmented mutations increases with increasing dosage and has an approximately linear dependence. L.S.

N65-26389 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

EVALUATION OF THE REPARATION OF RADIATION INJURIES ACCORDING TO AN INVESTIGATION OF THE STATE OF MYELOPOIESIS OF DOGS UNDER REPEATED ACTIONS OF IONIZING RADIATION

V. A. Rezontov *In its* Radiobiology 1964 p 149-156 refs (See N65-26378 15-04) CFSTI: $6.00

Myelopoiesis in dogs at various periods of recovery from radiation sickness was analyzed for evaluating the reparation of radiation injuries. The reaction of the blood system of the animals to the repeated influence of gamma radiation was also studied. The intensity of reparative regeneration of the hematogenic tissue was evaluated indirectly by measuring the rate of restoration of the leukocyte content in the peripheral blood of the dogs. Results indicate that during 1.5 months to 15 months after irradiation with doses of 300 rad, a decrease in the intensity of reparative regeneration of the hematogenic tissue is detected. The magnitude of this reduction of reparation potency of myelopoiesis did not depend on the degree of normalization of the cytological composition of the peripheral blood and bone marrow at the time of the repeated test irradiation. The decrease in the indicated residual effect with respect to time can be reduced to an exponential or logarithmic mathematical model. Extrapolation of the established dependence to the moment of natural death of the dogs leads to the assumption that the reparation potency of myelopoiesis can be restored by the end of the life to no more than 90% of the initial value after irradiation. L.S.

N65-26390 Atomic Energy Commission, Washington, D. C. Div. of Technical Information

INFLUENCE OF RADIOPROTECTIVE PREPARATIONS ON THE DISTRIBUTION OF NEUTRAL RED AND THE HEMOGLOBIN CONTENT IN THE ORGANS OF MICE AND RATS

P. G. Zherebchenko, G. M. Airapetyan, I. G. Krasnykh, and A. N. Shevchenko *In its* Radiobiology 1964 p 190-200 refs (See N65-26378 15-04) CFSTI: $6.00

Blood circulation in organs of mice and rats was traced to study the influence of various radioprotective drug preparations on the distribution of neutral red and hemoglobin content in the organs. Tables listing preparations, dosages, organs analyzed, survival data, hemoglobin content, and neutral red content support the experimental data. Among the drugs tested were tryptamine compounds, cystamine, acetylcholine, histamine, and unithiol, and their effect on the brain, liver, lungs, spleen, kidneys, skin, and muscles is discussed. L.S.

N65-26391# Joint Publications Research Service, Washington, D. C.

ROENTGENOLOGY AND RADIOLOGY IN INDUSTRY AND MEDICINE

15 Jun. 1965 47 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 10, no. 4, 1965
(JPRS-30622; TT-65-31265) CFSTI: $2.00

CONTENTS:

1. CALCULATION OF MAXIMUM PERMISSIBLE CONCENTRATIONS OF BETA-RADIOACTIVE GASES IN AIR OF WORK PREMISES AND IN THE ATMOSPHERE G. M. Obaturov p 1-12 (See N65-26392 15-04)

2. DISTRIBUTION AND BIOLOGICAL ACTION OF RADIOACTIVE ISOTOPES Ya. I. Moskalev p 13-20 refs (See N65-26393 15-04)

3. THE CONDITION OF WALLS OF LARGE BLOOD VESSELS IN ACUTE RADIATION SICKNESS K. B. Tikhonov and I. A. Chalisov p 21-27 refs (See N65-26394 15-04)

4. NEW SCINTILLATION MATERIALS FOR DOSIMETRY OF ROENTGEN AND GAMMA-RADIATION S. P. Vershinina, A. V. Chernobay, G. P. Zaplesnichenko, L. N. Kolesnikov, and Zh. V. Skuratovskaya p 28-30 refs (See N65-26395 15-06)

5. EXPERIMENTAL DATA ON THE ACTION OF IONIZING RADIATION ON THE BONES OF GROWING ANIMALS V. V. Kholin p 31-39 refs (See N65-26396 15-04)

6. EXPERIENCE IN UPGRADING QUALIFICATIONS OF LENINGRAD ROENTGENOLOGISTS AND RADIOLOGISTS Ye. I. Vorob'yev and N. Ya. Mil'man p 40-44

N65-26392 Joint Publications Research Service, Washington, D. C.
CALCULATION OF MAXIMUM PERMISSIBLE CONCENTRATIONS OF BETA-RADIOACTIVE GASES IN AIR OF WORK PREMISES AND IN THE ATMOSPHERE
G. M. Obaturov *In its* Roentgenol. and Radiol. in Ind. and Med., 15 Jun. 1965 p 1-12 (See N65-26391 15-04) CFSTI: $2.00

Presented are calculations of maximum permissible concentrations (MPC) of isotopes of radioactive gases in the air, which consider the effect of the following factors on the calculated MPC value: (1) internal radiation due to inhaled radioactive gas and gas dissolved in the human blood; (2) internal irradiation from radioactive daughter products of decay of the short-lived noble gases xenon and crypton; (3) restrictions in the space of work quarters ($R \neq \infty$, where R = effective radius of quarters); (4) radiobiological sensitivity of the human organs; and (5) absorption of β-particles in the dead layer of skin upon irradiation of the latter, in the skin upon irradiation of muscle and fat tissue, and in the cornea and frontal chamber upon irradiation of the eye lens. Comparative MPC data are included for work premises, sanitary-protective zones, and the populace. S.C.W.

N65-26393 Joint Publications Research Service, Washington, D. C.
DISTRIBUTION AND BIOLOGICAL ACTION OF RADIOACTIVE ISOTOPES
Ya. I. Moskalev *In its* Roentgenol. and Radiol. in Ind. and Med., 15 Jun. 1965 p 13-20 refs (See N65-26391 15-04) CFSTI: $2.00

An analysis of the distribution, kinetics of accumulation, and modes of excretion of radioactive isosotopes in various organs (liver, spleen, etc.) of living organisms, is presented. Included is a discussion of differences in the distribution patterns of several groups of elements, factors which alter the type of distribution of certain elements, criteria to be considered when estimating the toxicity of a given isotope, and the effectiveness of α-, β-, and γ-1 radiators in the organism. Considered in the analysis are the effects of differences in distribution of radioactive elements, and the effective period of half-excretion of the radiation source, on the pathogenesis of radiation sickness. S.C.W.

N65-26394 Joint Publications Research Service, Washington, D. C.
THE CONDITION OF WALLS OF LARGE BLOOD VESSELS IN ACUTE RADIATION SICKNESS
K. B. Tikhonov and I. A. Chalisov *In its* Roentgenol. and Radiol. in Ind. and Med., 15 Jun. 1965 p 21-27 refs (See N65-26391 15-04) CFSTI: $2.00

A comparative study of functional and morphological changes in large and small blood vessels, which occur during radiation exposure and radiation sickness is reported with emphasis on the causes and extent of injury to large vessels. Presented also are results of experimental studies on dogs and rabbits, which were subjected to whole-body, massive, and local irradiation, and which subsequently developed acute radiation sickness. No distinct symptoms of pathological changes were detected in large blood vessels during acute radiation sickness. Although severe contraction of these vessels occurred during the peak period of acute radiation sickness, it was concluded that these changes were functional and due to contraction of circular muscle fibers of the median arterial membrane. Organic changes, such as destruction and lesions of the walls, and hemorrhage were common only to small vessels. After massive irradiation, small vessels being the most physiologically active were more severely damaged; trunk vessels did not show appreciable structural alterations. Greatest damage was observed after exposure to local irradiation, which resulted in injuries so profound that total breakdown of the vascular walls occurred. Speculation is made concerning the significance of these findings in future research. S.C.W.

N65-26396 Joint Publications Research Service, Washington, D. C.
EXPERIMENTAL DATA ON THE ACTION OF IONIZING RADIATION ON THE BONES OF GROWING ANIMALS
V. V. Kholin *In its* Roentgenol. and Radiol. in Ind. and Med., 15 Jun. 1965 p 31-39 refs (See N65-26391 15-04) CFSTI: $2.00

A review of experimental studies reported in the literature, which focus on the influence of ionizing radiation and age on the extent of bone radiosensitivity in growing animals is presented. Also considered were studies on morphological and functional changes occurring after local irradiation, whole-body irradiation of large zones of the trunk, radiation resulting from the internal administration of radioactive agents; and changes occurring during acute radiation sickness. It is surmised that the pathogenesis of osteogenetic disturbances during radiation sickness are more complex than injuries occurring during local irradiation, since characteristic changes occur on all levels of the osteal system. In addition to the direct action of radiation on bone tissue, the mediated negative effect resulting from damage to several other systems plays an important role. Thus, osteogenic changes can occur during the presence or absence of radiation sickness. It is further noted that there exist no fundamental morphological osteogenic differences during radiation sickness or local irradiation injury. Thus, with decrease in age, the extent of radiation injury increases. S.C.W.

N65-26409*# Naval School of Aviation Medicine, Pensacola, Fla.
SOME RELATIONSHIPS BETWEEN BLOOD ALCOHOL, POSITIONAL ALCOHOL NYSTAGMUS (PAN), AND POSTURAL EQUILIBRIUM (ATAXIA)
Alfred R. Fregly, Martin Bergstedt, and Ashton Graybiel 17 Mar. 1965 19 p refs Joint Report with NASA
(NASA Order R-93)
(NASA-CR-63423; NSAM-917) CFSTI: HC $1.00/MF $0.50 CSCL 06T

Quantitative relationships were explored between blood alcohol levels, positional alcohol nystagmus (PAN), and postural equilibrium performances measured with a new quantitative ataxia test battery and with a series of clinical-type ataxia tests. Moderate amounts of 80-proof vodka (1 cc per lb. body wt.; 55-100 mg% blood alcohol level) produced appreciable decrements in the postural equilibrium functioning of all thirteen vestibular normal subjects evaluated. Maximum decrements occurred at 60-75 minutes following alcohol intake and were fairly well correlated with the peak blood alcohol levels. But more strikingly, the ataxic responses were in very close agreement with the intensity and duration of the PAN 1 (intoxication period) responses along the time axis. No systematic relationships between the ataxia test performances and PAN phase II responses were found. Ataxic performances recovered during the PAN II period. Repetition of the experiment two days later with the same subjects under increased stimulation (100-proof vodka in the same dosage) reproduced the findings generally proportional to the increased stimulus. Author

N65-26418*# Northrop Space Labs., Hawthorne, Calif. Space Labs.
FEASIBILITY STUDY OF INTEGRAL HEAT SINK SPACE SUIT CONCEPTS

A. P. Shlosinger and W. Woo May 1965 28 p refs
(Contract NAS2-2102)
(NASA-CR-63399; NSL-65-87-2) CFSTI: HC $2.00/MF $0.50
CSCL 06Q

This report presents the results of an analytical study to determine feasibility and identify problem areas of a space suit thermal control concept, relying on phase change of heat sink materials, distributed over the suit area, for control of sensible metabolic heat. The performance of materials with melting points below the desirable skin temperature of man with heats of fusion near or above 50 kilocalories/kg (100 BTU/lb) has been evaluated. The formation of a layer of molten heat sink material of low thermal conductivity has been identified as the major factor in limiting suit performance. Several concepts to improve suit performance are presented and evaluated as to their merit for further development work. Feasibility of the basic concept for stated limited operating time periods, and feasibility of the improved concepts has been demonstrated. Author

N65-26531 Library of Congress, Washington, D. C. Aerospace Technology Div.
OTHER FORMS OF IMAGES. THE RETINAL IMAGE AND ITS TRANSFORMATION WITHIN THE VISUAL SYSTEM
A. V. Luizov *In its* Quality of the Phot. Image 11 Mar. 1965 p 218–227 refs (See N65-26508 15-14)

An analysis of the factors contributing to the transformation of images and the transmission of information within the visual system, which focuses on the role of the retina and its component parts in the visual perception of objects at the moment of their projection into the visual field, is presented. Included is a comparative study of existing theories on the function of signals associated with brilliance variation, the existence of light sensitive substances within the cones, the flexibility and/or stability of the visual system, and the question of image reversal in the eye. Proposed is a formula which connects visual acuity with the contrast of an object against a background and with background brilliance. Speculation is made concerning the importance of related research on the visual system to the development of improved optical devices as telescopes, microscopes, and television screens. S.C.W.

N65-26570# School of Aerospace Medicine, Brooks AFB, Tex.
FATIGUE EFFECTS IN 24-HOUR SIMULATED TRANSPORT FLIGHT: CHANGES IN PILOT PROFICIENCY
Bryce O. Hartman Apr. 1965 9 p refs
(SAM-TR-65-16; AD-464380)

Each of four pilots completed a 24-hour simulator flight broken into eleven 2-hour legs terminated by an Instrument Landing System (ILS) landing. Two kinds of performance measures are presented: (a) 20-second time-lapse photographs recorded airspeed, altitude, and rate of climb (or compass heading) through cruise portions of each leg; and (b) the ground-track record of the ILS approach was photographed after each landing. The cruise portions of each leg showed an increasing variability in performance, but this change did not significantly reduce overall system efficiency. Instrument approaches were carried out at a high level of proficiency for approximately 20 hours, at which point there was a precipitous drop in performance. Author

N65-26585# California U., Berkeley. Operations Research Center
GROUP-TESTING WITH UNCERTAIN TEST RESULTS
R. M. Elashoff, Milton Sobel, and Marvin Schneiderman Jan. 1965 15 p
(Grant PHS-GM-9606-04)
(ORC-65-4)

Three models were proposed in order to classify a random sample of known units into good (or negative), and defective (or positive) categories. The models were discussed in the framework of testing the activity of experimental drugs and the detection of disease. Model I, *Lack of Specificity Problem*, allowed only false positives, and Model II, *Dilution Problem*, permitted only false negatives. Model III, *Both Errors Possible*, allowed for both positives and negatives. Variations of the models are also considered, and formulas are included. An effort is made to minimize the expected number of tests for the procedure, and it is assumed that the tests are carried out one at a time in a linearly-ordered manner. M.W.R.

N65-26596# Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information
INDUSTRIAL HEALTH IN HANDLING THORIUM
N. Yu. Tarasenko May 1965 84 p refs Transl. into ENGLISH from the publ. "Gigiena Truda pri Rabote s Toriem" Moscow, Gosatomizdat, 1963
(AEC-TR-6536(Rev.)) CFSTI: $3.00

An evaluation of the working conditions and prophylactic measures in the handling of thorium is given, after the principal physical and chemical properties of this element which are of interest to medical workers are outlined. The differing behavior of thorium in the organism depends on the state of its compounds and the presence of admixtures of daughter products of decay, as well as by the method of its administration. The generally poor absorbability; deposition of thorium in the osseous tissue, lungs, and reticuloendothelial system; and the prolonged retention of thorium in the sites of administration and deposition enhance the radiation effect of thorium since it acts as α-emitter with subsequent decay products. The hygenic and health aspects of working conditions involving thorium processes are analyzed, and detailed protection measures to insure safe working conditions are presented. G.G.

N65-26617# School of Aerospace Medicine, Brooks AFB, Tex.
THE ADAPTATION OF GAS CHROMATOGRAPHY TO THE PROBLEM OF PHYSIOLOGIC GAS ANALYSIS AT HIGH ALTITUDE Technical Documentary Report, 14 Feb.–8 Jul. 1964
Harold R. Andersen Apr. 1965 13 p refs
(SAM-TR-65-2; AD-464379)

A method which permits the analysis of mixtures of O_2, N_2, and CO_2 at high altitude is described. A commercial model gas chromatograph was modified to permit the introduction of the gas samples into the chromatograph at the altitude at which they were collected. The advantages of this procedure are: (a) minimal exposure of the investigator to high altitude, and (b) elimination of sample contamination which might result from descent to lower altitudes. Author

N65-26618# School of Aerospace Medicine, Brooks AFB, Tex.
LABORATORY PERFORMANCE OF AN AGING 20% STANNOUS FLUORIDE SOLUTION (CODE SAM X-14)
Ira L. Shannon Mar. 1965 10 p refs
(SAM-TR-65-15; AD-464184)

Determination of spatial distribution of barium ion densities and electron temperatures in a fully ionized barium plasma is described. The ion densities are deduced from measurement of resonance fluorescence of the barium ion excited by an external light source. The space resolution is provided by the volume of the overlap of the exciting beam and the field of view of the measuring monochromator. The exciting beam is modulated, and the detector includes a phase-sensitive lockin amplifier. The electron temperature is deduced from the rate

of electronic excitation and the measured plasma brightness without the externally induced fluorescence. It is only obtained as an average along the line of sight of the monochromator. Comparison of the measurements of the two resonance lines allows the conclusion that the effective threshold Gaunt factor for excitation of the 6^2P states of Ba^+ is approximately 0.34. In addition, the oscillator strengths of the 5^2D–6^2P transitions of Ba^+ have been determined, and found to be about twice as large as those calculated by the Coulomb approximation. Author

N65-26803# Joint Publications Research Service, Washington, D. C.
SOVIET STUDIES ON ROENTGENOLOGY AND RADIOLOGY
17 Jun. 1965 18 p refs Transl. into ENGLISH from Vestn. Rentgenol. i Radiol. (Moscow), no. 6, 1964 p 60-66, 72-74 (JPRS-30672; TT-65-31285) CFSTI: $1.00

CONTENTS:

1. A METHOD OF CALCULATING ABSORBED DOSES OF LONG-WAVE X-RAYS A. N. Krongauz and A. V. Frolova p 1-9 refs (See N65-26804 16-04)

2. THE EMPLOYMENT OF ADDITIONAL FILTERS TO DECREASE THE IRRADIATION DOSE IN ORDINARY ROENTGENOGRAPHY AND IN CERTAIN SPECIAL METHODS OF INVESTIGATION B. M. Aliyev and I. Ye. Rabkin p 10-15 (See N65-26805 16-04)

N65-26804 Joint Publications Research Service, Washington, D. C.
A METHOD OF CALCULATING ABSORBED DOSES OF LONG-WAVE X-RAYS
A. N. Krongauz and A. V. Frolova *In its* Soviet Studies on Roentgenol. and Radiol. 17 Jun. 1965 p 1-9 refs (See N65-26803 16-04) CFSTI: $1.00

The following parameters must be considered in choosing the optimal irradiation regime to provide the best therapeutic effect from calculated absorbed and integral absorbed radiation doses: (1) the regime of irradiation, indicating voltage production and filter; (2) the geometric conditions of irradiation; (3) the qualitative characteristics of irradiation determined by the half-value layer or by the effective energy of quanta; (4) the quantitative characteristics of irradiation generated by the X-ray tube; (5) the absorbed dose in the focus; (6) the distribution of the absorbed dose in surrounding tissues; and (7) the integral absorbed dose in the focus and in the entire body. Sample calculations for tumors located within or on the surface, respectively, of the integument are given. The size of the irradiation dose in this case is determined by clinical indexes depending on the histological structure of the tumor. G.G.

N65-26805 Joint Publications Research Service, Washington, D. C.
THE EMPLOYMENT OF ADDITIONAL FILTERS TO DECREASE THE IRRADIATION DOSE IN ORDINARY ROENTGENOGRAPHY AND IN CERTAIN SPECIAL METHODS OF INVESTIGATION
B. M. Aliyev and I. Ye. Rabkin *In its* Soviet Studies on Roentgenol. and Radiol. 17 Jun. 1965 p 10-15 (See N65-26803 16-04) CFSTI: $1.00

Aluminum filters of 1 mm and copper filters of 0.1 to 0.5 mm thickness were used as additional filters for ordinary roentgenography, for angiography, and for cinematography with an electron-optical converter to determine the relation between irradiation dosage and filtration of the primary beam. Studies on an osteo-paraffin phantom were compared with those carried out directly on patients. Roentgenograms taken both with the use of additional filters and without them differed very little from each other, but the employment of additional filters increased the sharpness of the picture and the distinguishability of detail, especially in angiography. Analysis of dosimetric measurements established that additional filters significantly decreased the size of the discharge dose and, consequently, the overall radiation load on patients without significant change in the quality of the roentgenogram. G.G.

N65-26917# Joint Publications Research Service, Washington, D. C.
EFFECTS OF SPACE FLIGHT ON VARIOUS PHYSIOLOGICAL FUNCTIONS
30 Jun. 1965 48 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 2, Mar.-Apr. 1965 p 169-187, 274-284
(JPRS-30859; TT-65-31379) CFSTI: $2.00

CONTENTS:

1. REACTIONS OF COSMONAUTS DURING PARABOLIC FLIGHT IN AIRCRAFT I. I. Kas'yan, I. A. Kolosov, V. I. Lebedev, and B. N. Yurov p 1-18 refs (See N65-26918 16-05)

2. THE DAILY RHYTHM OF VEGETATIVE FUNCTIONS DURING SPACE FLIGHT G. V. Altukhov, P. V. Vasil'yev, V. Ye. Belay, and A. D. Yegorov p 19-26 refs (See N65-26919 16-04)

3. OCULOMOTOR ACTIVITY IN COSMONAUTS DURING ORBITAL FLIGHTS I. T. Akulinichev, M. D. Yemel'yanov, and D. G. Maksimov p 27-33 refs (See N65-26920 16-05)

4. THE EFFECT OF ANGULAR AND CORIOLIS ACCELERATIONS ON CERTAIN FUNCTIONS OF THE HUMAN ORGANISM S. S. Markaryan p 34-45 refs (See N65-26921 16-04)

N65-26918 Joint Publications Research Service, Washington, D. C.
REACTIONS OF COSMONAUTS DURING PARABOLIC FLIGHT IN AIRCRAFT
I. I. Kas'yan, I. A. Kolosov, V. I. Lebedev, and B. N. Yurov *In its* Effects of Space Flight on Various Physiol. Functions 30 Jun. 1965 p 1-18 refs (See N65-26917 16-04) CFSTI: $2.00

Orientational training flights in aircraft with reproduction of brief episodes of weightlessness are an important element in the system for the preparation of cosmonauts for space flight. The flights permit the detection of individual differences in sensory, motor and vegetative responses of the subjects. During the action of gravitational loads unstable and reversible functional changes in the cardiovascular and respiratory systems of cosmonauts were observed; during the period of weightlessness an approximation of the physiological indices to the level recorded in horizontal flight was seen. The time for normalization of physiological functions under conditions of weightlessness depended primarily on individual peculiarities of the cosmonauts and a difference in their adaptability toward unusual conditions. A distinct resistance of cosmonauts to the intermittent action of gravitational loads and weightlessness has been detected, which can be used for prognostic purposes. Author

N65-26919 Joint Publications Research Service, Washington, D. C.
THE DAILY RHYTHM OF VEGETATIVE FUNCTIONS DURING SPACE FLIGHT

G. V. Altukhov, P. V. Vasil'yev, V. Ye. Belay, and A. D. Yegorov *In its* Effects of Space Flight on Various Physiol. Functions 30 Jun. 1965 p 19–26 refs (See N65-26917 16-04) CFSTI: $2.00

Presented is an analysis of the nature of changes in the daily rhythm of the heart rate and systolic index which in some measure reflect both the state of the cardiovascular system as well as the state of the entire organism. Emphasized are those features of the daily rhythm of physiological and particularly vegative functions which are induced during prolonged exposure to conditions of weightlessness. It is concluded that the mechanism for the disturbance of the daily rhythm of vegative functions is complex and probably related both to the specific effects of weightlessness as well as to neuroemotional tension. S.C.W.

N65-26920 Joint Publications Research Service, Washington, D. C.

OCULOMOTOR ACTIVITY IN COSMONAUTS DURING ORBITAL FLIGHTS

I. T. Akulinichev, M. D. Yemel'yanov, and D. G. Maksimov *In its* Effects of Space Flight on Various Physiol. Functions 30 Jun. 1965 p 27–33 refs (See N65-26917 16-04) CFSTI: $2.00

A study of oculomotor activity and the nature of eye movements of four Soviet cosmonauts during three to five days of orbital flight is reported. Results of an analysis of electrooculogram recordings indicated no persistent disturbances in coordination of ocular movements in any of the cosmonauts. Although changes were observed in the aysmmetry of oculomotor reactions and nystagmoid movements in two cosmonauts, the brevity and mildness of these changes were attributed to an actively proceeding process of adaptation to unusual circumstances of the external environment by higher segments of the central nervous system. It is surmised that during flight, the electrooculogram permits a fuller evaluation of the general status of cosmonauts and gives an objective evaluation of the state of the vestibular analyzer. S.C.W.

N65-26921 Joint Publications Research Service, Washington, D. C.

THE EFFECT OF ANGULAR AND CORIOLIS ACCELERATIONS ON CERTAIN FUNCTIONS OF THE HUMAN ORGANISM

S. S. Markaryan *In its* Effects of Space Flight on Various Physiol. Functions 30 Jun. 1965 p 34–45 refs (See N65-26917 16-04) CFSTI: $2.00

The effects of angular accelerations at rotational speeds of 180, 360, 540, and 720 degrees/second; and the effects of coriolis accelerations at speeds of 180, 360, and 540 degrees/second, on the physiological responses of seated human subjects, were studied. Augmentation of the speed and duration of angular acceleration caused an increase in the duration of vestibular nystagmus and the illusion of counterrotation. During angular acceleration and shortly thereafter, there was a deterioration in the ability to discern dial indicators and signs. With augmentation of the speed, there was an increase in pulse and respiration frequency. Repeated angular acceleration lead to general fatigue, disturbances in stasis, and to vestibulo-vegetative disturbances in persons with moderate vestibular sensitivity. Following angular acceleration there was a slowing of the pulse, a reduction in maximal arterial pressure, and an increase in minimal arterial pressure. By altering the position of the head during rotation a displacement of surrounding objects was experienced. With repeated inclinations and increased rotational rates, the displacement effect was amplified and vestibulo-vegetative disturbances occurred more rapidly. S.C.W.

N65-26948# Electro-Voice, Inc., Buchanan, Mich. Engineering Dept.

[DESIGN OF HELMETS, EARPHONES, AND MICROPHONES] Status Report, Nov. 15–Dec. 15, 1964

Robert C. Ramsey [1964] 13 p ref
(Contract AF 33(615)-1295)
(AD-461367)

The helmet modification to improve its noise attenuation characteristics by sealing the openings at the bottom of the cylindrical portion of the helmet is reported. Also, the possible coupling between the earphone and microphone circuits which can occur in the cabling is considered. Several simulated cable constructions were fabricated and tested using a plastic covered, stranded wire. From the cable measurements and the comparison of these measurements against the loss requirements, it was found that with some limitation of frequency response in the sidetone amplifiers that any of the common cable configurations would be adequate. The use of parallel twisted pairs seems to be the most desirable configuration since the parallel wire construction would be susceptible to external magnetic field pickup and the spiraled construction does not give the degree of protection that the parallel twisted pair gives. E.E.B.

N65-26955# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine

AVIATION MEDICINE TRANSLATIONS: ANNOTATED BIBLIOGRAPHY OF RECENTLY TRANSLATED MATERIAL III

Mary Ellen Allen, William E. Collins, Jerry V. Tobias, and Ruth Ann Crain Apr. 1965 19 p refs
(AM-65-17)

An annotated bibliography of translations of foreign-language research articles is presented. The 26 listed entries are concerned with studies of aviation medicine, periodicity, optokinetic nystagmus, vision, vestibular function, and physical science. Procedures for obtaining copies of the translations are included. Author

N65-26956# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine

ADAPTATION TO VESTIBULAR DISORIENTATION. I: VERTIGO AND NYSTAGMUS FOLLOWING REPEATED CLINICAL STIMULATION

William E. Collins May 1965 17 p refs
(AM-65-18)

Forty unilateral caloric irrigations were administered in a habituation series to each of two groups of subjects. One group was tested in total darkness. Subjects in the second group were stimulated in illumination and actively attempted to control and suppress their eye movements by means of visual fixation. Pre- and post-tests were administered (always in total darkness) in which both directions of response were elicited. In all cases, tasks were assigned to subjects to maintain alertness. The nystagmic reaction was altered as a result of the habituation series, but the change was different for the two groups. After one month of rest, there was no apparent recovery of the response toward the pretest level for either group. Sensations of vertigo declined in intensity for both groups, but showed recovery after a one-month rest period. Author

N65-26960# Joint Publications Research Service, Washington, D. C.

PREPARATION FOR HUMAN SPACE FLIGHT

V. Gzhel'skiy and V. Peredel'skiy 28 Jun. 1965 14 p Transl. into ENGLISH from Sovetskiy Voi'n (Moscow), no. 6, Mar. 1965 p 10–12 and 37–40
(JPRS-30817; TT-65-31354) CFSTI: $1.00

A brief nontechnical narrative of the operation of a centrifuge cabin, and of a heat and pressure chamber, during test run with a human subject is given. J.M.D.

N65-26966# Joint Publications Research Service, Washington, D. C.
CYBERNETICS AND PHYSICAL TRAINING
V. M. Zatsiorskiy 23 Jun. 1965 45 p refs Transl. into ENGLISH from Teoriia i Prakt. Fiz. Kul'tury (Moscow), no. 4, Apr. 1965 p 12-20 and no. 5, May 1965 p 22-30
(JPRS-30754; TT-65-31315) CFSTI: $2.00

It is reported that cybernetics can be of great value in studying activities involved in physical training and sports, since both cybernetics and physical training can be considered processes of control. The main object of a physical training program, it is stated, is to achieve the necessary physiological changes with desired magnitude and character rather than to accomplish the given tasks. Therefore, training of athletes should shift its emphasis from control of behavior to direct control of immediate training effect. The relationship between physiological behavior and immediate training effect should be closely investigated, and the development of devices with feedback to monitor activities is suggested. Control of the cumulative training effect is not clearly understood, but it is felt that the methods of cybernetics can be successfully applied here too. Various mathematical models to explain the training process are considered, including simple proportional and factorial linear models and a nonlinear model. Several methods of the algorithmetic diagnosis of training, and theoretical-informational methods in the investigation of the preparedness and actions of athletes are also considered. M.W.R.

N65-26994# Systems Technology, Inc., Inglewood, Calif.
THEORY AND SIMULATION OF PILOTED LONGITUDINAL CONTROL IN CARRIER APPROACH Final Report
Tulvio S. Durand Mar. 1965 86 p refs
(Contract NOw-62-0977-c; NOw-61-0519-c)
(STI-TR-130-1; AD-464703)

Analyses and experiments were performed to determine the causes of the pilot's "inability to control altitude," which is often described as the reason for a (minimum) limiting usable carrier approach airspeed. The analyses indicate that an altitude tracking performance defect is encountered at a certain speed assuming the pilot controls pitch attitude with elevator and altitude with throttle. The speed at which this theoretical "problem" is encountered seems to match well with flight test determined minimum carrier approach speeds for several aircraft. Thus the cause/effect relationship is clearly inferred. However, there is then considerable question as to why alternative piloting techniques which eliminate the "problem" are not used. To investigate such inferences and questions and to lend credence to the analyses, piloted simulation experiments were devised, implemented, and run. The trials and tribulations attending satisfactory fixed-base simulation with a minimum of equipment were encountered early. The steps finally taken to achieve suitable realism are described, as are the detailed results. In general, the results tend to support the theory, and shed some light on possible reasons for pilots' preference for an apparently inferior control technique. Five pilots rated 34 different airframe configurations, each simulating flight characteristics either above or below predicted minimum speeds. These ratings confirm the usefulness of an analytically determined "reversal parameter" for predicting the pilot-selected minimum approach speed. Results are also described of tests on modified airframe and display characteristics aimed at improving system performance. Author

N65-27020# Royal Inst. of Tech., Stockholm (Sweden). Speech Transmission Lab.
SPEECH TRANSMISSION LABORATORY QUARTERLY PROGRESS AND STATUS REPORT, 15 APRIL 1965
Gunnar Fant et al 15 Apr. 1965 61 p refs
(Contract DA-91-591-EUC-3413; Grants AF-EOAR-65-51; NIH G-NB-04003-03)
(STL-QPSR-1/1965)

Speech production and analysis, and aids for the deaf are discussed. The recording and analysis of the vocal tract frequency response by a sweep-tone method for collecting data samples of vowels and consonants was continued. Characteristic curves are shown for various sounds. Voice spectra are analyzed for studying how the source spectrum of a vowel may depend on articulatory factors. Stop gap and transition durations of speech material are analyzed from sound spectrograms; and phonemic identification with lip-reading alone and lip-reading supplemented by residual hearing or tactual communication were compared for effectiveness as training aids for the deaf. L.S.

N65-27025# Joint Publications Research Service, Washington, D. C.
ON THE SPECIFIC CHARACTER OF BIOLOGICAL STRUCTURES
M. F. Vedenov and V. I. Kremyanskiy 22 Jun. 1965 22 p Transl. into ENGLISH from Vopr. Filosofii (Moscow), no. 1, 1965 p 84-94
(JPRS-30737; TT-65-31306) CFSTI: $1.00

In attempting to develop a complete characterization of biological structure by distinguishing between living and nonliving systems, the concepts of regeneration, inheritance, locomotion, plasticity, adaptability, and systematic orderliness and partial disorderliness are discussed. J.M.D.

N65-27028# Joint Publications Research Service, Washington, D. C.
USE OF A GOLD-IRON ELECTRODE PAIR FOR THE ELECTROCHEMICAL RECORDING OF TISSUE OXYGEN IN VIVO
I. P. Berezin, I. M. Epshteyn, and L. A. Kashchevskaya 28 Jun. 1965 6 p refs Transl. into ENGLISH from Eksperim. Khirur. i Anesteziol. (Moscow), no. 3, May-Jun. 1964 p 18-19
(JPRS-30818; TT-65-31355) CFSTI: $1.00

An iron-gold pair of electrodes has been suggested for use both clinically and in experimental investigations because of their ability to register tissue oxygen tension. Experiments had been made with Au-Zn and Au-Fe electrodes, with the Au-Zn combination exhibiting more sensitivity. The method of covering the electrode with a gold layer is detailed, and the composition of the electrolyte used is given. The area of the iron electrode is 50 times that of the gold covering of the active electrode. To check the utility of the Au-Fe electrode pair, parallel measurements were made by chemical and electrochemical methods on the amount of dissolved O_2 in a 0.9% solution of NaCl after it had been boiled for 30 minutes, and in pure oxygen and air. It is also reported that an experiment done on the brain tissue of a rabbit breathing both pure O_2 and ordinary air reaffirms that the indicated pair of electrodes register tissue oxygen tension. The electrode pair studied can be used in various tissues and organs. M.W.R.

N65-27029# Joint Publications Research Service, Washington, D. C.
A METHOD FOR SIMULTANEOUS RECORDING OF RESPIRATORY MOVEMENTS AND SPEECH SOUNDS ON THE SAME MAGNETIC TAPE

V. P. Morozov 29 Jun. 1965 6 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 1, no. 6, Jun. 1964 p 762–764
(JPRS-30844; TT-65-31365) CFSTI: $1.00

A method for simultaneously recording speech sounds and excursions of the chest cage during phonation on magnetic tape is presented. Both processes are recorded on the same tape using two monophonic tape recorders. Respiratory movements are recorded electrically from a potentiometer mounted on the subject and activated by a strap which pulls on a cord connected to the potentiometer during respiration. Thus, an electric signal proportional to changes in the perimeter of the subject's chest during speech or singing is recorded synchronously with the sound. This method permits correlation of physical properties of speech sounds with certain phases of respiratory excursions within any time period, multiple simultaneous reproduction of the same recording of the two processes for demonstration purposes, and precise quantitative measurement of the magnitude of respiratory excursions according to the magnitude of output voltage of the recorder or amplitude of the graphic re-recording. R.N.A.

N65-27030# Joint Publications Research Service, Washington, D. C.
SOVIET RESEARCH ON THE EFFECTS OF VIBRATION
S. N. Sinitsin et al 29 Jun. 1965 13 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 3, Mar. 1964 p 3–10
(JPRS-30845; TT-65-31366) CFSTI: $1.00

Two studies dealing with the biochemical effects of vibration are presented. The first deals with the influence of generalized vibrations of varying amplitude on carbohydrate metabolism and adrenaline activity in rabbits. Four series of experiments were performed, each with a frequency of 50 cps: With an amplitude of 15μ, there were no changes in the animals. Exposures between 50μ and 100μ were associated with changes in the nature of the glycemic curves, whereas 200μ exposure was characterized by a drop in blood sugar and glycogen level as well as abnormal glycemic curves. When amplitude was raised to 800μ, there was marked decrease in blood sugar and an imbalance and drop in adrenaline activity. A study with shipyard workers suffering from vibration sickness showed their blood was low in 17-oxycorticocosteroid. Administration of ACTH usually did not bring about a change in 17-OCS content. It was concluded that decreased sensitivity of the adrenal cortex to ACTH is part of a general pattern of decreased sensitivity to external stimuli in persons suffering from vibration sickness. M.W.R.

N65-27032# Joint Publications Research Service, Washington, D. C.
MAN'S CAPACITY TO WORK IN A STATE OF WEIGHTLESSNESS
A. V. Yeremin, I. I. Kos'yan, I. A. Kolosov, V. I. Kopanev, and V. I. Lebedev 29 Jun. 1965 11 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR (Moscow), no. 3, May–Jun. 1965 p 329–334
(JPRS-30849; TT-65-31370) CFSTI: $1.00

In discussing reactions to weightlessness, the observation is made that spacemen have been able to do their jobs because they have been given relatively simple, short, methodical tasks to perform. In addition, the spacemen usually have been anchored to their work places. More complicated tasks which will require mobility will be necessary for prolonged space voyages. To overcome the unfavorable effects of weightlessness, it is suggested that research follow two paths: the first is to increase the potential of the human being and his ability to adapt to changes in gravitation; the second is to continue to improve space vehicles and their equipment. M.W.R.

N65-27033# Joint Publications Research Service, Washington, D. C.
TOXICOLOGICAL CHARACTERISTICS OF NEW RUBBER MIXTURE INGREDIENTS
R. S. Vorob'yeva and N. V. Mezentseva 29 Jun. 1965 8 p Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), v. 8, no. 7, 1964 p 39–43
(JPRS-30850; TT-65-31371) CFSTI: $1.00

To provide information about the toxicity of synthesized vulcanizing substances, studies were made with dipac (D) and paraquinone dioxime (PD), two accelerants, and mercaptobenzimidazol (M), an antioxidant. The effect of these compounds on the general state of health, body weight, and oxidation processes of laboratory animals was investigated. Changes in the behavior and general condition of the animals were not noted, and the M was found to be more toxic than the other two compounds with oral doses and with subcutaneous inoculations. When inoculated, M made the animals sluggish, decreased body weights, increased the size of kidneys, and disturbed oxidation processes. Changes in the nervous system caused by M were considered to be transient and easily reversible. All three compounds had adverse effects on the lungs, and only toward the end of the experiment did they affect the protein formation function of the liver. General anemia was caused by M, and both M and PD disturbed prothrombin formation and caused hemorrhage. M.W.R.

N65-27037# Joint Publications Research Service, Washington, D. C.
THE USE OF SATAL, A BULGARIAN DRUG, AS A THERAPEUTIC AGENT IN INDUSTRIAL LEAD POISONING
V. Petkov, V. Stovev, D. Bakalov, and L. Petev 30 Jun. 1965 11 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 4, Apr. 1965 p 42-49
(JPRS-30863; TT-65-31382) CFSTI: $1.00

Satal, a drug containing garlic bulb substance, was found to have a statistically significant effect on reduction of lead poisoning symptoms in workers. This was attributed to the fact that part of the lead powder which enters the digestive tract combines with the active sulfur components in the garlic and is precipitated in the form of insoluble sulfides which are not resorbed by the body. Also, a large part of the polysulfides is eliminated through the respiratory system. Two Satal lozenges, each containing 0.25 grams of garlic bulb substance, were given three times a day to a group of workers who had definite symptoms of lead poisoning, determined by porphyrins in the urine and basophilogranular erythrocytes in the blood. A control group with the same symptoms was not given the drug, and both groups carried out all the preventive measures required by the factory. At the beginning of the study, the experimental and control groups had approximately the same porphyrin counts, whereas at the end of period there was a significantly lower count for those taking the drug. The same was found for erythrocyte count. M.W.R.

N65-27062*# Nuclear Science and Engineering Corp., Pittsburgh, Pa.
A STUDY OF THE ROLE OF RADIOACTIVITY AND HYDROTHERMAL PROCESSES IN PROTOBIOCHEMISTRY
R. L. Bogner, S. L. Hood, E. R. White, and S. Somani Jun. 1965 70 p refs
(Contract NASw-989)
(NASA-CR-63560; NSEC-118) CFSTI: HC $3.00/MF $0.75 CSCL 06A

This report describes the initial phases of a study designed to test the novel and unique hypothesis that organic synthesis and chemical evolution in primitive planetary environments

may have proceeded in radioactive hydrothermal systems. It was demonstrated that an abundance of biochemically significant organic compounds can be formed from the simplest chemical resources in hot, aqueous environments under the influence of ionizing radiation. Furthermore, it was shown that high-molecular weight peptides and proteinoids can be produced in the same unique model system thus providing mechanisms for the generation of macromolecules, an essential development for the evolutionary progression from chemical simplicity to prebiotic molecular complexity. This experimental verification of the possible geological origin of biochemical substances (chemical abiogenesis) suggests that spontaneous primordial chemical reactions might well have led to the production and proliferation of organic molecules in favorable local environments, e.g. hot springs, early in the history of the planet Earth. These ground-based studies assume an immediate significance for lunar and planetary exploration in view of the fact that propitious geochemical events and conditions on the moon and Mars, similar to those present earlier in the history of the Earth, may provide primitive hydrothermal radioactive systems in which abiogenic formation of extraterrestrial organic compounds proceeds at present. Author

N65-27066# Joint Publications Research Service, Washington, D. C.

CONSTANT OF ION DISAPPEARANCE AND ITS HYGIENIC SIGNIFICANCE

V. F. Kirillov 29 Jun. 1965 6 p refs Transl. into ENGLISH from Gigiena i Sanit. (Moscow), no. 4, Apr. 1964 p 96-97
(JPRS-30842; TT-65-31363) CFSTI: $1.00

The number of light ions in the air of rooms is proposed as an indirect index of its hygienic quality. Since the index cannot be used in practice because of the impossibility of standardizing it, a practical index was sought. The equilibrium level of ionization (number of light ions in air) is postulated to depend on the intensity of ion formation and the rate of the process of ion destruction (disappearance constant). The disappearance constant theoretically can be used for characterizing the sanitary-hygienic degree of atmospheric purity. An experiment was conducted to verify the theoretical considerations. A ventilation setup with air recirculation was used. Tabulated results of the air ionization level, rate of ion formation, and disappearance constant are presented. The experimental results were thus far inconclusive, and the hygienic significance of the index also remains inconclusive. L.S.

N65-27067# Joint Publications Research Service, Washington, D. C.

CHEMISTRY AND SURGERY

B. V. Petrovskiy 30 Jun. 1965 16 p Transl. into ENGLISH from Priroda (Moscow), no. 3, 1965 p 16-24
(JPRS-30864; TT-65-31383) CFSTI: $1.00

The use of alloplastics in reconstructive and restorative surgery as well as in general surgical practice is discussed from a clinical point of view. The art of alloplastic surgery makes use of a multitude of polymers, including polyvinylalcohol sponges, capron fabrics, and other synthetic materials which can be accommodated or absorbed by the body. Mention is also made of gauze polymers treated with amino acids, flaps of fluoroplastic fabric for heart surgery, and plastic tubes and prostheses. M.W.R.

N65-27091# Aerospace Medical Div. Aerospace Medical Research Labs. /6570th/, Wright-Patterson AFB, Ohio. Behavioral Sciences Lab.

EFFECT OF AUGMENTED TELEVISION DEPTH CUES ON THE TERMINAL PHASE OF REMOTE DRIVING Final Report, Jan.–Apr. 1964

William N. Kama Apr. 1965 13 p ref
(AMRL-TR-65-6; AD-615929)

The ability of eight untrained subjects to position a mobile remote handling unit in the fore and aft dimension was assessed under each of four different viewing conditions. The viewing conditions investigated were: (a) direct viewing, (b) conventional 2-dimensional (2-D) closed-circuit television, (c) 2-D closed-circuit television augmented by shadows at the target, and (d) 2-D closed-circuit television augmented by converging light beams moving with the mobile unit. The results indicate that the augmented television conditions (c and d) facilitated successful positioning of the mobile unit. Under the augmented television conditions (c and d) there was a tendency to overshoot the target slightly. However, the amount and variability of the positioning errors were less under the augmented television conditions than under either the direct viewing condition or the conventional, unaugmented, television condition. The converging light system merits further investigation as a method of providing range information. Author

N65-27092# Lockheed-Georgia Co., Marietta.

PERFORMANCE OF VIGILANCE AND MONITORING TASKS AS A FUNCTION OF WORKLOAD Final Report, Dec. 1962–Apr. 1964

Thomas J. Hall, George E. Passey, and Thomas W. Meighan Wright-Patterson AFB, Ohio, AMRL, Mar. 1965 27 p
(Contract AF 33(657)-10506)
(AMRL-TR-65-22; AD-615921)

This study was conducted to obtain control data on the performance of three passive tasks– auditory vigilance, warning lights monitoring, and probability monitoring—performed previously in conjunction with three active tasks. Subjects were tested for 4 hours on each of 6 successive days. A task schedule requiring performance of all six tasks was employed on 2 hours of each daily session, while performance on the passive tasks alone was carried out during the remaining 2 hours. Performance on auditory vigilance, green warning lights, and probability monitoring was found to be superior when these passive tasks were performed alone. No difference in performance was found for red warning lights. Author

N65-27115# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF INTEROCEPTIVE AFFERENTATION UPON EXCITATION OF THE VOMITING CENTER DURING MOTION SICKNESS

I. D. Pestov 29 Jun. 1965 10 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 5, Sep.-Oct. 1964 p 690-694
(JPRS-30843; TT-65-31364) CFSTI: $1.00

The role of extralabyrinthine influences in the pathogenesis of motion sickness was studied. Apomorphine was administered to both intact and labyrinthectomized dogs for inducing excitability in the vomiting center, while irregularly rotating the dogs at speeds of 10 rpm to 16 rpm. By varying dosages and rotation speeds, and by measuring effective times of threshold dosages, the interceptive afferentation originating from the organs of the abdominal cavity was assessed. Results indicate that vestibular afferentation is the cause of increased excitability of the vomiting at rotation rates of 10 rpm, and that, with increasing rates of 12, 14, and 16 rpm, extralabyrinthine afferent influences on the vomiting center originate from the interoceptors of the abdominal cavity. Experiments using intraperitoneal novocaine anesthesia also support the conclusions. L.S.

N65-27136 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

RESULTS OF STUDY OF THE BIOLOGICAL EFFECTIVENESS OF A NUMBER OF SPACE-FLIGHT FACTORS

V. V. Parin, V. V. Antipov, B. I. Davydov, E. F. Panchenkova, G. A. Chernov et al *In its* Cosmic Res., Vol. 3, No. 2, 1965 20 May 1965 p 221-240 refs Presented at the 15th Intern. Congr. on Astronautics, Warsaw, 7 Sep.-12 Oct. 1964 (See N65-27125 16-13)

Experimental data on the biological effectiveness of a number of factors in space flight (vibration, acceleration, ionizing radiation; the combined action of radiation with dynamic space-flight factors), as evaluated from the changes in the serotonin and ceruloplasmin contents in the blood of mice, rats, guinea pigs, dogs and monkeys, are presented. The results obtained indicate that these methods are sensitive in evaluating the reactivity state of the animals under subjection to spaceflight factors. Author

N65-27158# Space Technology Labs., Inc., Redondo Beach, Calif. Environmental Control Equipment Section.

FIRST GENERATION MANNED SPACECRAFT ENVIRONMENTAL CONTROL SYSTEM

H. L. Mandelstam and A. W. Optican Mar. 1963 54 p refs (STL-9990-6397-RU-000)

The requirements, operation, and subsystems of a typical first generation environmental control system for a manned spacecraft are described. The subsystems include the space suit, air circulation, solid contaminant, carbon dioxide removal, trace gas contaminant control, primary and secondary oxygen supply, snorkel and cabin exhaust, coolant tank pressurization, and thermal control. Appendixes include calculations for the carbon dioxide removal and trace gas contaminant subsystems, and suit circuit and cabin heat exchangers. R.N.A.

N65-27188# Ohio State Univ., Columbus. Lab. of Aviation Psychology.

THE INFLUENCE OF EXPERIENCE AND INPUT INFORMATION FIDELITY UPON POSTERIOR PROBABILITY ESTIMATION IN A SIMULATED THREAT-DIAGNOSIS SYSTEM Technical Report, 1 Oct. 1963-1 Jun. 1964

David A. Schum, Irwin L. Goldstein, and Jack F. Southard Wright-Patterson AFB, Ohio, AMRL, Apr. 1965 78 p refs (Contract AF 33(657)-10763) (AMRL-TR-65-25; AD-615758)

This report describes two experiments in which posterior probability estimates made by humans are compared with similar estimates made by a computer using a modification of Bayes' theorem incorporating human estimates of $P(D|H)$. The task was to estimate, on the basis of intelligence data from a simulated threat-evaluation situation, the likelihood of various alternative hypotheses that could account for the observed data. The purpose of the first experiment was to determine the effect of increased experience upon the human's ability to estimate posterior probabilities. The purpose of the second experiment was to compare human and automated posterior probability estimates under several levels of input data fidelity. With respect to the design of diagnostic systems, the present research tends to confirm the feasibility of automated Bayesian hypothesis-selection incorporating expert human estimates of the conditional probabilities $P(D|H)$. Author

N65-27205# Office of Naval Research, Washington, D. C. Engineering Psychology Branch.

HUMAN ENGINEERING PROBLEMS OF LOW-ALTITUDE, HIGH-SPEED FLIGHT

James W. Mille[1964] 8 p refs Presented at AGARD Specialists Meeting on Low-Altitude, High-Speed Flight, Paris, 20-23 Oct. 1964 (AD-460918)

Pilot task loading, function allocation, specific displays, and pilot selection are discussed in reference to the human engineering aspects of low altitude flight. In a man-machine system, man is capable of functioning as a servomechanism, a controller, and a computer. However, this "black box" concept of him must take into account his physiological limitations, individual differences, motivation, nonlinearity, and adaptation. Pilot task loading is increasing and the margin of tolerable error is becoming narrower. In a low level flight a pilot must now perform more functions in less time than previously afforded him. In a low level system instrumentation design, the tendency has been to use conventional high altitude displays. High accuracy altimeter and turn and pitch displays require special consideration for low level missions. Proper maps must be designed using scale factors appropriate for the altitude. The matching of particular men to particular machines must be considered in pilot selection. Pilots differ greatly in their reactions to stress, buffeting, ability to get lost, and in their confidence of automatic systems. R.N.A.

N65-27217 Defence Research Medical Labs., Toronto (Ontario).

THE PHASE DIFFERENCE FUNCTION IN BINOCULAR FLICKER

P. J. Foley and P. Stager Repr. from Can. Psychology, v. 19, no. 1, 1965 p 47-55 *Its* Res. Paper No. 545

Two experiments were carried out to determine the functional relation between the critical flicker frequency (CFF) of two identical intermittent targets, binocularly superimposed, and the phase difference between the targets. Binocular CFF is a monotonic decreasing function of phase difference, positively accelerated for phase differences between 0° and 180° and negatively accelerated for phase differences between 360° and 180°. It is postulated that the results can be accounted for by assuming the existence of something akin to the "isodynamic" cells of Cajal, and that more weight is attached to the input to these cells from one eye than from the other. Author

N65-27244 Joint Publications Research Service, Washington, D. C.

THE PROPAGATION OF EXCITATION IN ONE-DIMENSIONAL STRUCTURES

B. R. Telesnin *In its* Izv. VUZov: Radiophys., Vol. VIII, No. 1, 1965 24 Jun. 1965 p 219-229 refs (See N65-27225 16-34) CFSTI: $6.00

Continued studies of one-dimensional structures of homogeneous excited tissues which focus on the propagation of excitation along a segment of a line during periodic excitation of its edge, are reported. Presented are results of an analytical and experimental investigation of the stability of different arrangements of pulses in a ring, using discrete models constructed with a digital computer. The influence of the initial conditions on the propagation of excitation in lattice structures of homogeneous tissue was also examined. S.C.W.

N65-27267# Joint Publications Research Service, Washington, D. C.

STUDIES IN NUTRITION

8 Jun. 1965 28 p refs Transl. into ENGLISH from Vopr. Pitaniya (Moscow), v. 24, no. 2, Mar-Apr. 1965 p 3-7, 40-46, 89-91 (JPRS-30497; TT-65-31208) CFSTI: $2.00

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3. UKRAINIAN REPUBLIC CONFERENCE OF PHYSICIANS ON HYGIENE OF NUTRITION IN CONNECTION WITH THE USE OF POISONOUS CHEMICALS IN AGRICULTURE G. V. Gracheva p 20–25

N65-27268 Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF INDICES OF METABOLISM OF SOME VITAMINS IN THE ORGANISM OF DOGS FED ON MEAT PRODUCTS SUBJECTED TO THE EFFECT OF PASTEURIZING DOSES OF GAMMA-RADIATION

Yu. I. Shillinger, V. G. Kachkova, and N. B. Maganova *In its* Studies in Nutr. 8 Jun 1965 p 10–19 refs (See N65-27267 16-04) CFSTI: $2.00

The effect on animal metabolism of radiolabile vitamins due to radiating dietary meat was studied. For an 18-month period, dogs were fed beef and pork products irradiated with pasteurizing doses of gamma radiation; a control group fed on non-irradiated meat was maintained during the same period. The radiation appeared to cause no deficiency of thiamine, pyridoxine, and vitamins E and K in the experimental dogs, and no difference in variability of the vitamin indices was observed between the experimental and control groups. J.M.D.

N65-27287# Air Force Systems Command, Wright-Patterson AFB, Ohio. Behavioral Sciences Lab.

ENGINEERING PSYCHOLOGY, TRAINING PSYCHOLOGY, ENVIRONMENTAL STRESS, SIMULATION TECHNIQUES, AND PHYSICAL ANTHROPOLOGY. 1964 SUPPLEMENT TO BIBLIOGRAPHY OF REPORTS ISSUED BY BEHAVIORAL SCIENCES LABORATORY

Lavon E. Trygg, comp. 1 Jan. 1965 16 p refs (AD-464531)

N65-27334# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Biophysics Lab.

A SUMMARY OF HUMAN TOLERANCE TO PROLONGED ACCELERATION Final Report, Jan. 1963–Jan. 1965

Alvin S. Hyde and Harold W. Raab Feb. 1965 42 p refs (AMRL-TR-65-36; AD-615329)

Human subject tolerance to accelerations of greater than one second duration is summarized for the orthogonal X, Y, and Z axes. Because each investigator at each laboratory utilizes different restraint systems, body positions, ambient temperatures, etc, and most important, utilizes different criteria of "tolerance," the data are referenced and presented in tables and graphs for each major category (direction) of acceleration. The points presented in the graphs and tables are usually the highest values achieved; in each series there were subjects who could not tolerate the given direction, amplitude, and duration. Author

N65-27388*# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.

LEKTON

Warren S. Mc Culloch [1965] 66 p Introduction to "Logical Structure of Mind" by Eilhard von Domarus

(Grants NsG-496; NSF GP-2495; NIH G-MH-04737-04; Contracts DA36-039-AMC-03200(E); AF 33(615)-1747 et al) (NASA-CR-63609) CSCL 06J

A discussion of the philosophical foundation of psychology and psychiatry is presented, and the ontological significance of facts (called entities or relata) is demonstrated with respect to their responsibility for the logical structure of mind. The discussion is divided into three categories: (1) the sciences of mind, (2) the science of matter, and (3) the science of the concrete. Certain terms such as "passage", "extension", "idea", and "intention", are defined and related throughout to the discussion. Under the first category, topics such as associationlism, gestalt, reflexology, social and act psychology, and dynamism are discussed. In the second category, the entities are discussed from the viewpoint of Newtonian mechanics, statistical mechanics, biology, biophysics, and relativity. Relations, concreteness, evolution, ambiguity, idea origin, intention, mattering, minding, logical mind structure, and extraduction are other aspects of the general theme that are deliberated. L.S.

N65-27397*# Bunker-Ramo Corp., Canoga Park, Calif.

MEASUREMENT CRITERIA IN MAN MACHINE SYSTEMS SIMULATION

R. W. Obermayer Washington, NASA, Jul. 1965 24 p refs (Contract NASw-869)

(NASA-CR-257) CFSTI: HC $1.00/MF $0.50 CSCL 05H

This report describes simulation, models and games as analogies. They resemble in some way something else about which information is desired. We may therefore measure an analogy instead of the real-world object. Critical dimensions of analogies are the level of abstraction and the fidelity of simulation, however, if the object is to measure, the most critical aspect is the validity of measurement. Unfortunately, validity is not always a practical concept. Since the objective of measurement is to derive information, simulation studies are analyzed with respect to information objectives in the attempt to derive criteria for measure selection. Author

N65-27419# Library of Congress, Washington, D. C. Aerospace Technology Div.

SECOND INTERNATIONAL SYMPOSIUM ON BASIC ENVIRONMENTAL PROBLEMS OF MAN IN SPACE

23 Jun. 1965 18 p Meeting held at Paris, 14–18 Jun. 1965 *Its* Special Issue, Vol. 3, No. 253

Basic environmental problems of man in space are presented and include biomedical studies on Voskhod 1, the effect of combined space flight factors on the functions of an organism, prolonged exposure to a pure oxygen atmosphere, radiation safety on long flights, Vostok and Voskhod life support systems, sensory activity and space physiology, and man–machine system reliability. R.N.A.

N65-27420# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

TORQUE FREE ROTATIONAL DYNAMICS OF A VARIABLE-CONFIGURATION BODY (APPLICATION TO WEIGHTLESS MAN)

James M. Mc Crank and Daniel R. Seger (M.S. Thesis) May 1964 170 p refs

(GAW/ME/64-19; AD-610239)

The foreseen problems of a free-floating space worker require a theoretical method of analyzing the rotational effects of body configuration changes. To complete such a study, a

mathematical model of the human body was utilized to approximate the dynamic properties of the body. Assuming the body to be isolated (no external torques or forces), the principle of conservation of angular momentum (about the system center-of-mass) was applied to develop three simultaneous, first order, non-linear differential equations with variable coefficients. The components of the body spin vector are the time dependent quantities in these equations. A computer program was developed to solve the equations by numerical methods. Results of the program include: body spin vector components and their rates of change, position of the system center-of-mass, acceleration of various points in the system, and body orientation change.
Author

N65-27425# Joint Publications Research Service, Washington, D. C.
SOVIET RESEARCH ON INSOLATION
9 Jun. 1965 18 p refs Transl. into ENGLISH from Vopr. Kurortol., Fizioterapii i Lecheb. Fiz. Kul't. (Moscow), no. 2, Mar.–Apr. 1964 p 104–112
(JPRS-30527; TT-65-31225) CFSTI: $1.00

CONTENTS:
1. THE INFLUENCE OF INSOLATION OF THE COLLAR ZONE ON CONDITIONED REFLEX ACTIVITY AND ARTERIAL PRESSURE OF ANIMALS V. A. Baronenko p 1–8 refs (See N65-27426 16-04)
2. THE INFLUENCE OF INSOLATION ON RESPIRATION V. A. Gamburtsev p 9–15 (See N65-27427 16-04)

N65-27426 Joint Publications Research Service, Washington, D. C.
THE INFLUENCE OF INSOLATION OF THE COLLAR ZONE ON CONDITIONED REFLEX ACTIVITY AND ARTERIAL PRESSURE OF ANIMALS
V. A. Baronenko *In its* Soviet Res. on Insolation 9 Jun. 1965 p 1–8 refs (See N65-27425 16-04) CFSTI: $1.00

1. A series of daily solar irradiation of the collar zone in doses from 3 to 24 cal (24 procedures) elicits changes in conditioned reflex activity and arterial pressure dynamics of healthy rabbits. 2. The effect of insolation is phasic. It first elicits a phase of excitation that lasts for 24 hours, then a prolonged phase of inhibition (up to one week), and then a stable phase of normalization of conditioned reflex activity. 3. During the phases of excitation and inhibition of conditioned reflexes the animals revealed significant elevation of arterial pressure, lasting for seven to ten days. And during the phase of normalization of conditioned reflexes the pressure drops and becomes stabilized. 4. The phasic nature of changes in conditioned reflex activity is related to the typological features of the animals, but this cannot be said of the arterial pressure which is in closer relationship with the functional state of the central nervous system. 5. Insolation of the collar zone (in small doses) ultimately has a stimulating effect on conditioned reflex activity and causes a persistent drop (within normal range) in arterial pressure. This effect is more pronounced in animals of the strong type.
Author

N65-27427 Joint Publications Research Service, Washington, D. C.
THE INFLUENCE OF INSOLATION ON RESPIRATION
V. A. Gamburtsev *In its* Soviet Res. on Insolation 9 Jun. 1965 p 9–15 (See N65-27425 16-04) CFSTI: $1.00

A study on the influence of sun baths on voluntary changes in respiration, which focuses on establishing effective methods of gaging sun baths in the presence of pathophysiological diseases, is reported. It is shown that voluntary respiratory excursions of the chest distinctly reflect the physical condition during sun baths. The influence of solar radiation on this index varies according to sex, age, and the physical condition of individuals. An increase in the number of sun baths is paralleled by an increase in duration of the phase of intensified function: the body becomes gradually conditioned to the effect of solar radiation. Persons who are highly sensitive to the sun, particularly in the presence of nervous and cardiovascular diseases, reveal a marked decrease in duration of the phase of intensified function during sun baths. Results confirm the selection of sun bath doses determined at resorts, and allow determination of the dosage and duration of solar therapy courses for individuals and groups of patients.
S.C.W.

N65-27447# Atomic Energy of Canada, Ltd., Chalk River (Ontario).
ANALYSIS OF EXTERNAL RADIATION EXPOSURES IN 1964
G. Cowper and P. C. Rowe Feb. 1965 18 p refs
(AECL-2239) Available from Atomic Energy of Canada, Ltd., Chalk River: $0.50

An analysis of occupational radiation exposures received by workers at AECL in 1964 has been carried out by machine accounting methods. Results are presented in tables and graphs.
Author

N65-27468# Atomic Energy Commission, Washington, D. C. Div. of Biology and Medicine.
LATE IRRADIATION EFFECTS CONFERENCE: INVENTORY OF CAPABILITY
Paul S. Henshaw, ed. May 1965 329 p refs Sum. of proc. of conf. held at Germantown, Md., 4–6 Dec. 1963
(WASH-1059) CFSTI: $4.50

Proceedings of the conference were summarized to indicate criteria used to investigate late irradiation effects, to consider the character of radiation-induced degenerative changes and relate them to natural aging processes, and to suggest future directions for research. The problem was defined and manifestations of late radiation effects were discussed in terms of the whole organism, tissues, and cells and biochemical changes. Similarity between late effects and the signs and symptoms of normal aging, the relationship between irradiation and degradative change, and prenatal irradiation and later life vigor were also discussed. Other topics reviewed by the conference participants include *Capability Reserves and Subclinical Effects; Biologic Organization and Degradative Change;* and *The Nature of Irreparable Radiation Injury.* Suggestions for future research were aimed at finding more precise data on histopathological changes with age, tumor incidence and its relation to dosage, and means of counteracting degradative trends.
M.W.R.

N65-27471# Atomic Energy of Canada, Ltd., Chalk River (Ontario).
MEASUREMENT OF THE DOSE ABSORBED IN VARIOUS ORGANS AS A FUNCTION OF THE EXTERNAL GAMMA RAY EXPOSURE
A. R. Jones Oct. 1964 21 p refs
(AECL-2240) Available from Atomic Energy of Canada, Ltd., Chalk River: $1.00

An average man phantom, containing all bones of the head and trunk, was irradiated from in front, behind and rotationally with gamma rays of various energies. The exposure at sites within and on the surface of the phantom were measured with lithium fluoride dosimeters. Also the exposures at the same

points in space were similarly measured in the absence of a phantom. Among sites chosen were the gonads, representative points in the red bone marrow and the usual film badge positions. From the measured ratio of the internal and external exposure the absorbed dose at important sites was computed as a function of external exposure for gamma rays of varying energy and direction. Author

N65-27513*# Naval School of Aviation Medicine, Pensacola, Fla.
VISUAL ILLUSIONS OF MOVEMENT
Thomas C. D. Whiteside, Ashton Graybiel, and Jorma I. Niven 21 Oct. 1963 19 p refs Joint Report with NASA Its Rept.-90 (NASA Order R-93)
(NASA-CR-63651; NSAM-877; FPRC-1207) CFSTI: HC $1.00/MF $0.50 CSCL 06P

The autokinetic, oculogyral, and oculogravic illusions all involve apparent motion or displacement of the visual field with respect to an observer. It is shown that these illusions are related to involuntary eye movements, occurring either spontaneously as in the autokinetic illusion, or in response to the special stimuli associated with the other two illusions. During fixation the visual sensation of movement seems to be produced by, or related to, the pattern of efferent activity aimed at the group of extraocular muscles which will act as antagonists to the involuntary eye movement referred to. Author

N65-27517*# Army Biological Labs., Fort Detrick, Md. Physical Defense Div.
DRY HEAT STERILIZATION OF MICROORGANISMS AT 105°C
Dorothy M. Portner 7 Jun. 1965 5 p refs
(NASA Order R-35)
(NASA-CR-63665) CFSTI: HC $1.00/MF $0.50 CSCL 06M

The effectiveness of dry heat at 105° C (221° F) against different levels of microbial contamination on glass surfaces, either embedded or not embedded in plastic, was investigated. Limited tests were run at 105° C and those which were performed were done with spores on exposed surfaces or organisms in soil. No death rates were determined on organisms embedded in plastic. The reason for conducting further studies at this low temperature was that Dr. Imshenetsky indicated the Russian spacecraft would be sterilized by exposure to 105° C for a few days. This temperature is considerably lower than any temperature NASA has considered for dry heat sterilization of space probes. Therefore, the investigation reported here was undertaken to obtain more information on the effectiveness of dry heat sterilization at this lower temperature. Author

N65-27526# Mason Research Inst., Worcester, Mass. Dept. of Immunology
ANTIGEN-ANTIBODY RESPONSES IN THE RHESUS MONKEY. FREEZE-PRESERVATION OF RHESUS MONKEY ERYTHROCYTES Progress Report
Arthur E. Bogden [1965] 20 p refs
(Contract AF 41(609)-2667)
(AD-465702)

The effect of freeze-preservation and subsequent thawing on Rhesus erythrocytes was studied comparing three endocellular cryophylactic agents (ECA) glycerol, propylene glycol, and dimethylsulfoxide. Cellular destruction, cellular morphology, and specific hemagglutinability were used as parameters for successful freeze-preservation. Propylene glycol was a satisfactory ECA in respect to minimal cellular destruction (5%), as well as to the other parameters studied. Dimethylsulfoxide was very hemolytic to Rhesus erythrocytes directly upon mixing; 85% of the erythrocytes were destroyed. Erythrocytes mixed with glycerol showed less cellular destruction before and after freezing and thawing. However, such cells had an altered morphology, were variable in their agglomerability in glucose-fructose solutions, and hemolyzed upon resuspension in buffered isotonic salt solution. Hemagglutination reactions with cells frozen in propylene glycol and aged for 24 hours in buffered saline were strong and clear cut with evidence of a prozone and a definite negative end-point. Good serologic reactivity of such cells persisted over the 8 day study period. R.N.A

N65-27531# Bryn Mawr Coll., Pa. Dept. of Biology.
EFFECT OF COLD ON BLOOD CLEARANCE OF CARBON AND BACTERIA OF DIFFERENT VIRULENCE
L. Joe Berry and Dorothy S. Smythe Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Jan. 1965 18 p refs
(Contract AF 41(609)-1764)
(AAL-TDR-64-14; AD-615010)

Mice singly housed without bedding at 5° C cleared carbon from the blood more slowly than animals similarly housed at 25° C. Increasing the time of exposure to cold to 2, 18 or 72 hours does not further alter the rate of clearance. Bacteria are also "cleared" uniformly at the two temperatures when a highly virulent strain (SR-11) of *Salmonella typhimurium* is injected intravenously, but not when one of low virulence (RIA) is used. The RIA strain disappears from blood more slowly in mice at 5° C than in those at 25° C. This was demonstrated both by dilution counts and by labeling the bacteria with P^{32} and following the decline in radioactivity of blood with time. Livers of mice were sampled at times postinfection for radioactivity and for viable bacterial counts. Housing temperature had no effect on radioactivity changes, but viable counts were higher and decreased more slowly in mice at 5° C than at 25° C. These findings are believed to account, in part, for the greater susceptibility to infection with RIA that was previously seen in mice exposed to cold compared to those at 25° C. Author

N65-27544 Chicago Univ., Ill.
STUDY OF MONKEY, APE, AND HUMAN MORPHOLOGY AND PHYSIOLOGY RELATING TO STRENGTH AND ENDURANCE. PHASE IV: THE MUSCULOSKELETAL ANATOMY OF THE THORAX AND BRACHIUM OF AN ADULT FEMALE CHIMPANZEE
William E. Edwards Holloman AFB, N. Mex., Aeromed. Res. Lab. (6571st), Apr. 1965 47 p refs
(Contract AF 29(600)-3466)
(ARL-TR-65-3; AD-615561)

The left thoracic and brachial musculature of a young-adult female chimpanzee is described and illustrated with the accuracy of detail plus clarity made possible by the photo-etching process. Other data are depicted graphically by section drawings. Comparisons with data from the literature on other chimpanzees, apes, humans, and non-hominoid primates are also provided, with emphasis on quantitative aspects. Author

N65-27561# American Foundation for Biological Research, Madison, Wis
THE DISTRIBUTION OF ICE IN FROZEN TISSUES OF FROGS AND MICE
B. J. Luyet, M. Ross, P. M. Gehenio, J. Nath et al Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Dec. 1964 36 p refs
(Contract AF 41(657)-343)
(AAL-TDR-63-28; AD-615009)

Distribution of ice was observed in the frozen organs of animals. Various tissues and organs were excised from freshly killed frogs and mice, and were frozen at temperatures from −1 to −5° C. Sections were photographed in the frozen state, and during and after thawing. The ice distribution observed in skin, digit, mesentary, blood vessel, intestine, liver, lung, and heart sections are presented with discussion. J.M.D

N65-27567# Tactical Air Command, Langley AFB, Va.
OPERATIONAL TEST AND EVALUATION—EXPOSURE SUIT, CWU-10/P Final Report
Wayne E. Williams and Clifford J. Whitham, Jr. Jan. 1964 12 p
(TAC-TR-63-31(D); AD-428692)

The CWU-10/P Anti-exposure Coverall was evaluated to determine its overall suitability. The tests revealed that the coverall did have some improvements over previous types but is unacceptable in that it does not provide adequate protection for the extremities during immersion in cold water. Other deficiencies were revealed that will require correction before the CWU-10/P can be considered a suitable anti-exposure coverall. Author

N65-27575# Ohio State Univ., Columbus. Div. of Occupational Medicine.
ACUTE HEPATOTOXICITY AND ENZYMATIC RESPONSE TO HYDRAZINE AND 1,1-DIMETHYLHYDRAZINE IN RATS
Charles F. Reinhardt and Mildred K. Pinkerton (AMRL) Wright-Patterson AFB, Ohio, AMRL, Feb. 1965 39 p refs
(Contract AF 33(657)-1698)
(AMRL-TR-65-19; AD-614587)

The in vivo and in vitro effects of hydrazine and of 1,1-dimethylhydrazine (UDMH) on blood serum and liver tissue enzyme activities were studied. The specific enzymes investigated were lactic dehydrogenase, isocitric dehydrogenase, malic dehydrogenase and glutamic acid dehydrogenase. Activity levels were determined at 16, 24, 48 and 72 hours after intraperitoneal administration of the toxic agents to rats. Attempts were made to correlate enzyme levels with altered liver pathology. Results were compared with a concomitant study of the effects of carbon tetrachloride on the same enzymes and on liver pathology. Results indicated that the mechanisms of toxic action for these three chemical agents are probably dissimilar and that serum enyzme levels may not provide sensitive indications of altered liver pathology in the case of hydrazine or UDMH. Author

N65-27586# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COSMIC HORIZONS OF ANABIOSIS
N. Timofeyev 30 Mar. 1965 9 p Transl. into ENGLISH from Nauka i Zhizn' (Moscow), no. 2, 1964 p 54–57
(FTD-TT-65-72/1 + 2; AD-614394)

A popularized article on hibernation of space crews as a method for making long space flights is presented. TAB

N65-27607# Southern Interstate Nuclear Board, Atlanta, Ga.
STUDY OF APPLICABILITY OF RADIATION PASTEURIZATION OF FRUITS IN THE SOUTH, MARCH 1–SEPTEMBER 1, 1964
Buford B. Ruhl 15 Sep. 1964 113 p refs
(Contract AT(38-1)-368)
(TID-21710) CFSTI: $4.00

Pasteurization of fruits by irradiation for reducing spoilage and for extending their marketable life, and the future applications of this technology to the South's fruit industries was studied. Postharvest physiology, wholesomeness, safety, spoilage rates, demand, and selected irradiation costs for oranges, grapefruits, tomatoes, peaches, and strawberries are considered. Tables, graphs, and maps showing fruit origin and destination regions are included. L.S.

N65-27609 Joint Publications Research Service, Washington, D. C.
ISOTOPES—EFFECTIVE TOOLS OF MODERN MEDICINE
Shih-chen Wang *In its* Transl. on Communist China's Sci. and Technol. 11 Jun. 1965 p 1–8 Transl. into ENGLISH from K'o-hsueh Ta-chung (Peiping), no. 4, Apr. 1965 p 3–5 (See N65-27608 16-34) CFSTI: $1.00

The uses of isotopes in the various fields of clinical, preventive, and general medicine are discussed. Isotopes are used in the examination and diagnosis of disease in the intestinal tract and liver. They can determine the fluid content of the body. Isotopes have definite characteristics and by analyzing the spectrum of a substance, elements can be identified and their proportions determined. This method can be used to determine the content of inorganic constituents in the blood stream. Isotopes can destroy malignant tumors and cancerous tissue. Dermatologists use isotopes to treat surface tumors and skin diseases. Bone cancer and leukemia can be treated by radioactive phosphorus, and radioactive colloidal gold is used to treat ascites and pleural effusion. Radioactive iodine is used to treat overactive thyroids and malignant thyroid tumors. Isotopes have an enormous potential in the field of sterilization. Their greatest contribution is their use as a research tool to study the phenomena of life and the causes of disease. R.N.A.

N65-27637# Tactical Air Command, Langley AFB, Va
OPERATIONAL TEST AND EVALUATION HELMET, FLYING TYPE HGU-15/P
John N. Ewbank Mar. 1964 27 p
(TAC-TR-63-31(H); AD-435604)

The HGU-15/P Flying Helmet was evaluated under operational conditions to determine its overall suitability and aircrew acceptability. The helmet was flown in F-4B, F-105D and F-104C aircraft for a total of 41 sorties. The HGU-15/P Helmet did perform as designed but is unsatisfactory for use by aircrews during all tactical operations. It would probably produce dangerous fatigue and discomfort during flights of long duration as this factor was apparent on flights of only 1–2 hours. The helmet had poor aircrew acceptability due to the increased weight, restrictions to head movement, distractions from reflections and no dilute-demand regulator necessitating continuous 100% oxygen. The helmet did provide a significant improvement in outside noise attenuation. Author

N65-27676*# National Aeronautics and Space Administration, Washington, D. C.
ON THE VARIATION OF STRENGTH DURING MOVEMENT [UBER DIE VERANDERUNG DER KRAFT WAHREND DER BEWEGUNG]
J. H. O. Reijs May 1965 38 p refs Transl. into ENGLISH from Arch. Ges. Physiol. (Berlin), v. 191, 1921 p 234–257
(NASA-TT-F-9339) CFSTI: HC $2.00/MF $0.50 CSCL 06S

The significance of measurements of variations in strength during movement with respect to remedial exercises, design of artificial limbs, etc., is first discussed. The author describes a dynamometer for measuring strengths of various muscles in terms of a weighted pendulum, and problems associated

with statistical variations due to physiological conditions such as fatigue. Extensive tests of hand grip and strength of the back muscles are then given for 2,000 people of both sexes, and ages from 6 to 60 years and are found to agree well with those of Quetélet and Dementjeff. The relation of the strength of the left hand to lefthandedness is examined for both men and women. Author

N65-27686*# National Aeronautics and Space Administration, Washington, D. C.

RELATION OF LENGTH OF CARDIAC CYCLE PHASES AND RATE OF PRESSURE CHANGE IN RIGHT AND LEFT VENTRICLES [SOOTNOSHENIYE DLITEL'NOSTI FAZ SERDECHNOGO TSIKLA i SKOROSTI IZMENENIYA DAVLENIYA v PRAVOM i LEVOM ZHELUDOCHKAKH]

Ye. B. Babskiy (Acad. of Sci. Ukrain. SSR), V. S. Sal'manovich, and I. L. Kosharskaya May 1965 9 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 161, no. 4, 1965 p 986-988

(NASA-TT-F-9384) CFSTI: HC $1.00/MF $0.50 CSCL 06P

The purpose of the present study is to study the time structure of the systole in the right and left ventricles and to establish a coordination between the operation of these divisions throughout the cardiac cycle. Experiments were conducted on 50 dogs. It is found that the rate of pressure rise and fall in the left ventricle is several times higher than in the right. Author

N65-27709*# National Aeronautics and Space Administration, Washington, D. C.

SOME RESULTS OF MEDICAL INVESTIGATIONS CARRIED OUT DURING THE FLIGHT OF VOSKHOD [NEKOTORYYE REZUL'TATY MEDITSINSKIKH ISSLEDOVANIY, PROVEDENNYKH VO VREMYA POLETA KORABLYA "VOSKHOD"]

P. V. Vasil'yev and Yu. M. Volynkin Jun. 1965 24 p refs Transl. into ENGLISH from paper presented at 2d Intern. Symp. on Basic Environ. Probl. of Man in Space, Paris, 14-18 Jun. 1965 p 1-23

(NASA-TT-F-9423) CFSTI: HC $1.00/MF $0.50 CSCL 06S

Results of medical investigations by telemetry and portable instrumentation in the Voskhod flight are summarized. Physiological reactions of cosmonauts with reference to flight stages are analyzed and their origins hypothesized. The lack of pathologic reactions is stressed. Author

N65-27710*# National Aeronautics and Space Administration, Washington, D. C.

PHYSIOLOGICAL AND HYGIENIC EVALUATION OF THE LIFE SUPPORT SYSTEMS USED ON VOSTOK AND VOSKHOD SPACECRAFT [FIZIOLOGOGIGIENICHESKAYA OTSENKA SISTEM ZHIZNENNOGO OBESPECHENIYA KOSMICHESKIKH KORABLEY "VOSTOK I VOSKHOD"]

G. I. Voronin, A. M. Genin, and A. G. Fomin Jun. 1965 17 p Transl. into ENGLISH from paper presented at the Second Intern. Symp. on Basic Environ. Probl. of Man in Space, Paris, 14-18 Jun. 1965

(NASA-TT-F-9424) CFSTI: HC $1.00/MF $0.50 CSCL 06K

The life support systems for the Vostok and Voskhod spacecraft were developed within the design limitations of the craft to cover normal flight and some emergency situations. Extensive ground research went into the design of these systems, which are not self-regenerating but are based on chemically-bound oxygen, CO_2 and water vapor absorbents, and carried food and water stocks. Various life support schemes and their suitability under different flight conditions are discussed. Data from ground studies of life support systems are presented and compared with data from actual flights. Author

N65-27711*# National Aeronautics and Space Administration, Washington, D. C.

EFFECTS OF THE COMBINED STRESSES OF SPACE FLIGHT ON CERTAIN BODY FUNCTIONS [KOMBINIROVANNOYE VOZDEYSTVIYE FAKTOROV KOSMICHESKOGO POLETA NA NEKOTORYYE FUNKTSII ORGANIZMA]

G. M. Frank, N. N. Livshits, M. A. Arsen'yeva, Z. I. Apanasenko, L. A. Belyayeva et al Jun. 1965 51 p refs Transl. into ENGLISH from paper presented at 2d Intern. Symp on Basic Environ. Probl. of Man in Space, Paris, 14-18 Jun. 1965

(NASA-TT-F-9425) CFSTI: HC $3.00/MF $0.50 CSCL 06S

The effect of space flight factors, acceleration, vibration, ionizing radiations, and the complex action of dynamic and radiation factors on some functions and oxidation metabolism of the central nervous system are considered. The combined effect of these factors on cell division in hematopoietic tissues, as well as the effect of acceleration on cerebral blood flow are studied. The variety and complexity of the results of combined dynamic and radiation factors stem from numerous combined action mechanisms. The oxygen effect on the processes of cell division and on the reactions of the central nervous system cannot be ignored. Such factors as protective inhibition, parabiotic phenomena, origin of dominant foci, play a significant part in the central nervous system reactions to combined action. Author

N65-27712*# National Aeronautics and Space Administration, Washington, D. C.

SOME ASPECTS OF SENSORY ACTIVITY AS APPLIED TO PROBLEMS IN SPACE PHYSIOLOGY [NEKOTORYYE VOPROSY DEYATEL'NOSTI SENSORNYKH SISTEM PRIMENITEL'NO K ZADACHAM KOSMICHESKOY FIZIOLOGII]

V. D. Glezer, V. A. Kislyakov, V. A. Kozhevnikov, V. N. Chernigovskiy, and L. A. Chistovich Jun. 1965 24 p Transl. into ENGLISH of paper presented at 2d Intern. Symp. on Basic Environ. Probl. of Man in Space, Paris, 14-18 Jun. 1965

(NASA-TT-F-9426) CFSTI: HC $1.00/MF $0.50 CSCL 05H

Orientation in space and recognition of visual images and speech sounds are considered in relation to obtaining and processing information from manned space flights. The role of the astronaut in the information processing system is shown schematically. Diagrams are included to show the operation of the receptive fields of the retina and to indicate the relationship between the amount of information obtained by an observer and the time required for information processing after recognition of variously oriented lines and pictures of objects. The relationship between discrimination of 3-element sequences and duration of constituent sounds is also presented. It is concluded that it is unrealistic to assume that an artificial system of movements can be devised to transmit at the same rate as the speech organs, and that voice communication is the most promising method of transmitting information from the astronaut to the machine. M.W.R.

N65-27713*# National Aeronautics and Space Administration, Washington, D. C.

EFFECTS ON THE ORGANISM OF PROLONGED EXPOSURE (100 DAYS) TO PURE OXYGEN AT A GENERAL PRESSURE OF 198 mm Hg [VLIYANIYE NA ORGANIZM DLITEL'NOGO PREBYVANIYA (100 SUTOK) V ATMOSFERE CHISTOGO KISLORODA PRI OBSHCHEM DAVLENII 198 MM RT. ST.]

N. A. Agadzhanyan, Yu. P. Bizin, G. P. Doronin, A. G. Kuznetsov, and A. R. Mansurov Jun. 1965 14 p refs Transl. into ENGLISH of paper presented at 2d Intern. Symp. on Basic Environ. Probl. of Man in Space, Paris, 14-18 Jun. 1965 13 p

(NASA-TT-F-9427) CFSTI: HC $1.00/MF $0.50 CSCL 06S

Effects of various artificial atmospheres, with reduced total pressure and normal O_2 content, are examined. Pure O_2 atmospheres are tested with 148 white rats for 100 days at 198 mm Hg. Effects on reflexes, reaction to stimuli, and physical and cardiac changes are discussed. Author

N65-27714*# National Aeronautics and Space Administration, Washington, D. C.
HUMAN RELIABILITY IN SPACECRAFT CONTROL SYSTEMS [PROBLEMY NADEZHNOSTI CHELOVEKA V SISTEMAKH UPRAVLENIYA KOSMICHESKIM KORABLEM]
P. K. Isakov, V. A. Popov, and M. M. Sil'vestrov Jun. 1965 11 p refs Transl. into ENGLISH of Paper presented at 2d Intern. Symp. on Basic Environ. Probl. of Man in Space, Paris, 14–18 Jun. 1965 11 p
(NASA-TT-F-9428) CFSTI: HC $1.00/MF $0.50 CSCL 05H

The special problem of man's reliability as operator in different spacecraft control systems necessitates models permitting estimating stability of optimum and prescribed working characteristics and their physiological mechanism. Weightlessness, alternating time allowances to function, and multiple information transfer determine peculiarities in constructing systems. Author

N65-27715*# National Aeronautics and Space Administration, Washington, D. C.
RADIATION SAFETY CRITERIA FOR PROLONGED SPACEFLIGHTS [KRITERII RADIATSIONNOY BEZOPASNOSTI DLITEL'NYKH KOSMICHESKIKH POLETOV]
Yu. G. Grigoryev, Ye. Ye. Kovalev, A. V. Lebedinskiy, Yu. G. Nefedov, V. G. Vysotskiy et al Jun. 1965 24 p refs Transl. into ENGLISH of paper presented at 2d Intern. Symp. on Basic Environ. Probl. of Man in Space, Paris, 14–18 Jun. 1965 32 p
(NASA-TT-F-94209) CFSTI: HC $1.00/MF $0.50 CSCL 06R

The authors discuss types of radiation, their energy, the dimensional dose distributions, and the RBE of ionizing radiations to be found in an Earth-lunar trajectory. The organization of a spaceflight radiation safety system is presented. Author

N65-27724*# National Aeronautics and Space Administration, Washington, D. C.
TRANSFORMATION OF AMINO-ACYL-s-RNA INTO DIPEPTIDYL-s-RNA BY MEANS OF A WATER-SOLUBLE CARBODIIMIDE [PREVRASHCHENIYE AMINOATSIL-s-RNK V PEPTIDIL-s-RNK PRI POMOSHCHI VODORASTVORIMOGO KARBODIIMIDA]
V. K. Altunina, S. N. Zagrebel'nyy, and D. G. Knorre Jul. 1965 15 p refs Transl. into ENGLISH from Biokhimiya (USSR), v. 30, no. 1, 1965 p 189–194
(NASA-TT-F-9448) CFSTI: HC $1.00/MF $0.50 CSCL 06A

A study was carried out of the interaction between s-RNA from baker's yeasts and the acylating agent obtained from p-toluene sulphonate of N-cyclohexyl-N[β-(N-methylmorpholinium)]-ethylcarbodiimide and from formylamino acids. It was shown that under the conditions used C^{14}-valyl-s-RNA is transformed into formylglycylvalyl-C^{14}-s-RNA with a yield of 70%. Under similar conditions deacylated s-RNA combines with 7% C^{14}-formylalanine. No inactivation of s-RNA with regard to incorporation of C^{14}-valine by aminoacyl-s-RNA-synthetases from rat liver was noted. Author

N65-27730# Advisory Group for Aeronautical Research and Development, Paris (France).
CURRENT RESEARCH ON ADVANCED COCKPIT DISPLAY SYSTEMS
Roger L. Winblade (NASA. Flight Res. Center) Oct. 1964 27 p refs
(AGARD-491)

Current cockpit display philosophy is discussed in terms of the pilot's informational requirements. Pilot's scan patterns obtained through the use of an eye-position camera and a ground-based simulator are depicted for both a conventional display system and two advanced concepts. Preliminary results of some flight-test and ground-simulation evaluations of advanced concepts, such as totally integrated displays and indirect pilot viewing systems, are discussed. Author

N65-27748# Library of Congress, Washington, D. C. Aerospace Technology Div.
SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS. PART A: BIOSCIENCES Surveys of Soviet-Bloc Scientific and Technical Literature
30 Dec. 1964 18 p refs Compilation of abstracts
(ATD-P-64-66; AD-609827)

Selected articles from the Soviet open liteature are reviewed under three general headings: space medicine and biology, space physiology, and space vehicle ecology. In the first section are included overviews of acheivements in space medicine and in the natural and social sciences. Space physiology articles are concerned with: 1) effect of high temperature and insolation on mineral salt content of body fluids; 2) distribution of body water in animals under various temperatures; 3) use of synthetic compounds to increase heat resistance of the body; and 4) changes in carbohydrate metabolism under conditions of total body vibration. An article dealing with the photosynthesis of *Chlorella vulgaris* Beyer in open-tank mass culture is reviewed in the ecology section. M.W.R.

N65-27771# Atomic Energy Commission, Washington, D. C. Div. of Technical Information
RADIOBIOLOGICAL PROBLEMS OF AEROSOLS. PROPERTIES AND HAZARDS OF RADIOACTIVE AEROSOLS PRODUCED BY ATOMIC TECHNIQUE. I: RADIOIODINE (SURVEY) [RADIOBIOLOGISCHE AEROSOLFRAG. EIGENSCHAFTEN UND RISIKEN ATOMTECHNISCHER RADIOAKTIVER AEROSOLE I: RADIOJOB]
W. Herbst 1965 52 p refs Transl. into ENGLISH by Scripta Technica from Zentr. Biol. Aerosol Forsch. (Stuttgart), v. 11, no. 3, 1963 p 232–273
(AEC-TR-6550) CFSTI: $2.00

The properties, distribution, biological hazards, identification methods, and safety measures are reviewed for radioactive iodine, one of the principle radionuclides resulting from atomic fission which is of primary importance in radiation protection. Radioiodine in the biosphere and its environment is considered for air, soil, water, plants, animals, and humans. Biological toxicity of the radionuclide, histological and functional thyroid effects, disturbance of reproductive capability and DNA-metabolism of cells, carcinogenic effects, and genetic effects are included. E.E.B.

N65-27793# Michigan Univ., Ann Arbor. Communication Sciences Lab.
THEORIES OF AURAL PHYSIOLOGY
Dennis H. Klatt Nov. 1964 148 p refs
(Contract Nonr-1224(22))
(Rept.-13; AD-610827)

In this investigation an attempt has been made to formulate specific theories for relating structure to behavior in several portions of the peripheral auditory system. The

hypotheses presented are based upon the anatomy and physiology of the mammalian ear. The behavior patterns implied by the set of mathematical assumptions have been investigated by employing homomorphic physical models. An electronic analog of the cochlea and electronic models of primary and secondary auditory neurons have been designed and tested. A general purpose digital computer was used in the design of the cochlear model and in the statistical processing of the outputs of the electronic model neurons. The behavior of the simulated neurons has been compared to that of the natural system as a function of various types of input waveforms. The results of the investigation contribute to a further understanding of the methods of information encoding and processing in the auditory system. Author

N65-27798# Ohio State Univ. Research Foundation, Columbus.

THE POSITIVE AFTERIMAGE AND MEASUREMENTS OF LIGHT AND DARK ADAPTATION, SEPTEMBER 1, 1962–OCTOBER 31, 1964

Glenn A. Fry Brooks AFB, Texas, AF School of Aerospace Med. [1964] 45 p refs

(Contract AF 33(657)-9615)

(AD-610733)

This paper describes an attempt to solve the extent to which adaptation at the center of the fovea undergoes change and to what extent this affects performance of a given task by constructing a system with a sensor which will simulate the changes in position and direction of an eye and provide a running record of changes in retinal illuminance at the center of the fovea. The next step is to build an analog computer which will compute changes in mechanisms of adaptation found in the photoreceptors. A study of the positive afterimage has been carried out with the aim of making allowance for its effect on the state of adaptation. The problems of chromatic adaptation have been considered, but the analog computer described in this report is basically a device for computing changes in bright and dark adaptation. The equations and constants used in designing the computer are based primarily on Rushton's measurements of retinal bleaching and Wright's subjective measurements of bright and dark adaptation. Author

N65-27809# Joint Publications Research Service, Washington, D. C.

PHYSIOLOGICAL EFFECTS OF GRAVITATION

O. G. Gazenko et al 1 Jul. 1965 31 p refs Transl. into ENGLISH of a Russian paper delievered to COSPAR at 8th Plenary Meeting and the 6th Intern. Symp. on Space Sci., Buenos Aires, 10–21 May 1965

(JPRS-30893, TT-65-31392) CFSTI: $2.00

Physiological effects of weightlessness are considered for: 1) the sphere of afference and analyzer activity, 2) the effector sphere and coordination of movements, and 3) the sphere of regulation of autonomic functions. From various physiological measurements on cosmonauts before and after flight, some preliminary results are indicated. The influence of weightlessness as a mechanical factor does not play a major role directly on the course of physiological processes. Upon entering the weightless state, the following mechanisms of organism adaptations take place: 1) mechanisms of nonspecific adaptation; 2) adjustment in the afferent sphere: new coordination of external and internal analyzers, leading to a possibly clearer picture of the environment than when a subject is under the conditions of gravitation, 3) adjustment in the regulation of activity in the inner organs and new coordination of their activity; and 4) adjustment in somatic functions. L.S.

N65-27837# Air Force Systems Command, Wright-Patterson AFB, Ohio. Biomedical Lab.

THE CARBON DIOXIDE RESPONSE CURVE OF THE DOG AT SEA LEVEL AND AT ALTITUDE

Erwin R. Archibald (Ph.D. Thesis, Calif. Univ.) Dec. 1964 165 p refs

(AMRL-TR-64-145; AD-615967)

Carbon dioxide response curves were measured in three trained dogs before, during, and after an 18-day sojourn at 12,470 ft altitude. The effects of sedation on CO_2 sensitivity were studied in two dogs, using scopolamine and scopolamine-thiopental. In addition, tests were made for the presence of an hypoxic drive component in resting ventilation at altitude by measuring the effect on ventilation of a sudden change in alveolar O_2 tension from 55 mm Hg to 110 mm Hg. Reductions occurred in resting alveolar O_2 and CO_2 tensions to 53 and 71% of sea level control, respectively. On the average, CO_2 sensitivity was increased during the first 10 days to 160% of sea level control. The CO_2 response curve was shifted horizontally to the left by about 8 mm Hg. This decrease in CO_2 threshold was statistically significant ($P < 0.01$). Sedation increased the variability of the results. Tests for an hypoxic drive component showed a transitory reduction in alveolar ventilation occurring 1 minute after the increase in alveolar O_2 tension. In subjects under sedation with scopolamine-thiopental, 40% of resting ventilation was attributable to peripheral chemoreflexes. Author

N65-27857# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ALGAES: CHLORELLA AND FURCELLAIRA, AND THEIR BIOLOGY AND APPLICATION

Henry Bukowiecki and Miroslawa Furmanowa 28 Jan. 1965 12 p Transl. into ENGLISH from Farm. Polska (Warsaw), v. 19, no. 19–20, 1963 p 393–396

(FTD-TT-64-731/1+2; AD-456410)

The relationship between the geological age of algae and their distribution is discussed: the older the algae variety, the wider its habitat. This principle is illustrated in the cases of *Chlorella, Rhodophyta,* and *Phaeophyta*. The strong possibility of using algae as food for astronauts and for purifying air in close quarters is considered. The natural supply and availability of the algae *Furcellaria fastigiata*, of interest as a source of Baltic agar, are outlined. J.M.D

N65-27862# Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab

FLASHBLINDNESS PROTECTION: THE EYE PATCH

J. H. Hill and Gloria T. Chisum 5 May 1965 28 p refs

(NADC-ML-6326; AD-464192)

Two experiments were conducted to evaluate the effectiveness of a simple eyepatch as a flashblindness protective device and to provide an indication of the desirability of using large numbers of observers in flashblindness research. The results indicate that a simple eyepatch does provide some protection from flashblindness and that a completely light tight seal is not necessary for this device to be effective. Because of the noxious nature of the stimulus, the general applicability and significance of data collected from large numbers of observers is questionable. The results of unsophisticated and, presumably, relatively unmotivated observers are at variance with those of more sophisticated observers. Author

N65-27877*# Oak Ridge National Lab., Tenn. Neutron Physics Div.

CALCULATED TISSUE CURRENT-TO-DOSE CONVERSION FACTORS FOR NUCLEONS BELOW 400 MeV

C. D. Zerby and W. E. Kinney May 1965 81p refs Submitted for Publication
(NASA Order R-104; Contract W-7405-ENG-26)
(NASA-CR-63754; ORNL-TM-1038) CFSTI: HC $3.00/MF $0.75 CSCL 06R

To assist in the evaluation of the hazard associated with exposure to high-energy neutrons or protons, a series of Monte Carlo computer programs were used to calculate the energy deposition that results from high-energy incident nucleons as a function of depth in a slab of tissue. The programs included nonelastic and elastic interactions, as well as evaporation processes and nuclear recoils. A 30-cm-thick infinite slab of tissue was treated, and cases of normal and isotropic incidence of 400-, 300-, 200-, 100-, and 60-MeV protons and neutrons were computed. From these data current-to-dose conversion factors were extracted for the average-whole-body, the 5-cm-depth, the surface, and the maximum doses. A set of quality factors (QF's) was adopted for transforming rad dose to rem dose, but detailed energy-deposition data are also presented so that any preferred set of QF's can be used to obtain estimates of the rem dose. dose. Author

N65-27891# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
HUMAN FACTORS IN REMOTE HANDLING: A REVIEW OF PAST AND CURRENT RESEARCH AT THE AEROSPACE MEDICAL RESEARCH LABORATORIES
William N. Kama Jul. 1964 13 p refs
(AMRL-TR-64-122; AD-610732)

This report discusses and summarizes the human factors research that has been accomplished in the area of remote handling since 1959. Discussion of this research program is made in terms of the various factors that affect remote handling operations—task variables, equipment variables, operator variables, sensory/perceptual problems, and controls. Identification of future research areas is made. Author

N65-27906# RAND Corp., Santa Monica, Calif.
A DEFENSE OF NEURAL MODELLING
Donald H. Perkel and George P. Moore (Calif. Univ., Los Angeles) Jan. 1965 10 p refs
(P-3057; AD-610580)

Several instances are cited of the use of computers by research workers in neurophysiology in gaining information from theoretical neuron models. The general philosophy of theoretical models in research is discussed. This review was motivated by an earlier statement that such use of computers and theoretical models had not been found in the literature on neurophysiology or psychology J.M.D.

N65-27930# Defence Research Board, Ottawa (Ontario). Directorate of Scientific Information Services
DAMAGE TO METAL-CONTAINING ENZYMES AS A PRIMARY MANIFESTATION OF THE BIOLOGICAL ACTION OF PENETRATING RADIATION
S. Ye. Manoilov Nov. 1964 13 p refs Transl. into ENGLISH from Tr. Mosk. Obshchestva Ispytatelei Prirody (Moscow), v. 7, no. 2, 1963 p 30-41
(T-413-R; AD-610805)

The trigger mechanisms of the primary biological action of penetrating radiation are discussed. Both ionization and molecular excitation are considered in detail. From experimental and theoretical investigations, it is concluded that the primary trigger mechanism of the biological activity of penetrating radiation is connected with the destruction of metal-containing enzymes that catalyze biological oxidation. The result of this damage is to bring about in irradiated tissues an irreversible state of hypoxia leading to the death of highly organized animal organisms. E.E.B.

N65-27933# Stanford Research Inst., Menlo Park, Calif.
EXPERIMENTS ON VISUAL RESPONSES IN INSECTS Final Report, 14 Oct. 1963–14 Oct. 1964
J. C. Bliss, W. D. Chapple, H. D. Crane, and H. F. Seeley Nov. 1964 67 p refs
(Contract AF 49(638)-1112)
(AFOSR-65-0042; AD-610426)

The optomotor response of the milkweed bug *Oncopeltus fasciatus* Dallas (Hemiptera) is described. The bug was placed in the center of a rotating striped drum; as the drum rotates, the bug tends to turn in the direction of rotation. This turning tendency vs drum speed approximates the bell-shaped curve first measured by Hassenstein. Also, the optical constants of compound eyes was measured and offers possible explanation of certain observed phenomena relating to the appearance of multiple image planes behind the array of lenslets. The cyclic discharge of motor fibers in response to decreases in light intensity is also discussed. A similar discharge was observed using a single 55° rotation about the animal; the ratio of firing frequency of the large motor fibers in the left and right metathoracic roots was a function of the direction of rotation. The firing frequency was also a function of the speed of stripe rotation. Stimulation experiments also suggest that the response is triggered by a simple phasic discharge in the connectives. A physiological model incorporating the results of these experiments is included. E.E.B.

N65-27946*# Systems Technology, Inc., Hawthorne, Calif.
DEVELOPMENT OF SATISFACTORY LATERAL-DIRECTIONAL HANDLING QUALITIES IN THE LANDING APPROACH
Robert L. Stapleford, Donald E. Johnston, Gary L. Teper, and David H. Weir Washington, NASA, Jul. 1965 122 p refs
(Contract NAS2-864)
(NASA-CR-239) CFSTI: HC $4.00/MF $1.00 CSCL 01B

An analytical method is presented for developing satisfactory lateral-directional handling qualities in the landing approach. The method includes the following three steps: 1. Analysis of the handling qualities of the basic airframe to determine what deficiencies, if any, exist; 2. Determination of stability augmentation requirements for satisfactory handling qualities; and 3. Assessment of the operational tradeoffs among the various mechanizational possibilities. Preliminary estimates of the values necessary for a good pilot rating are derived from previous studies and from tests of several supersonic transport configurations evaluated on the Transport Landing Simulator. Author

N65-27953*# Washington Univ., St. Louis, Mo. Dept. of Economics
THE SUPPLY OF ENGINEERS AND SCIENTISTS
Hugh Folk 10 Jun. 1965 61 p refs *Its* Working Paper No. 6506
(Grant NsG-342)
(NASA-CR-27953) CFSTI: HC $3.00/MF $0.75 CSCL 05I

Some of the aspects of the supply of engineers and scientists are discussed and data are presented on enrollments, degrees, earnings, and occupational choices of persons with engineering and science degrees. Among the conclusions of the analysis were the following: (1) Over the period 1950 to 1960, the rate of change of the number of nongraduate engineers in the various specialties is highly correlated with the rate of change of the number of graduate engineers in the same specialties. (2) Men graduating in engineering and science do not all enter engineering or science. The proportion of engineering graduates

entering such jobs is much higher than the proportion of men with science degrees. (3) Over one-half of the very able freshmen choosing engineering and science as careers change career anticipations by their senior year. (4) Over the past 30 years there has been little change in the prestige ranking of engineering relative to other occupations commonly entered by college graduates. Engineering starting salaries have increased steadily as a percentage of general business trainees starting salaries, however, for chemists such salaries have declined. E.E.B.

N65-27956*# Arlington State Coll., Tex.
[A STUDY OF THE EFFECTS OF PROTECTIVE FILTERS AND LENSES ON COLOR JUDGEMENT] Final Report
Garvin Mc Cain [1957] 14 p refs
(Grant NsG-548)
(NASA-CR-63766) CFSTI: HC $1.00/MF $0.50 CSCL 05E

Continued studies on human color vision, which were designed to determine the effects of protective filters and lenses on color judgment, are reported. Presented are preliminary results of an extended study which focuses on determining whether previously observed shifts in color judgments following prolonged exposure to color lenses was an increasing function of the period of exposure. Results suggest that prolonged exposure to a part of the spectrum may change color judgments and that this change may persist over extended periods. Inherent problems associated with test apparatus and equipment are discussed. Although there is no clear theoretical explanation of the shift in color judgments, the effect resembles after effects found in other sense modalities. Speculation is made concerning the influence of some process above the retinal level on color judgment shifts. S.C.W.

IAA ENTRIES

A65-25239
ORGANIZATION OF THE SENSORY HAIRS IN THE GRAVITY RECEPTORS IN UTRICULE AND SACCULE OF THE SQUIRREL MONKEY.
Heinrich H. Spoendlin (Zürich, Universität, Otorhinolaryngologische Klinik und Poliklinik, Zürich, Switzerland).
Zeitschrift für Zellforschung, vol. 62, 1964, p. 701-716. 27 refs.
Grant No. NsG 268-62; U.S. Public Health Service Grants No. B-3447; No. B-3779.

An experimental investigation of the organization of two types of sensory hairs in the vestibular sensory epithelia of squirrel monkeys and guinea pigs. The surface of the sensory epithelia of the macula utriculi and sacculi consists of the top of the hair cells as well as supporting cells. In the anaesthesized animal, the vestibulum of one ear was opened wide and the macula exposed. The macula was carefully removed and placed in cold buffered osmic acid for fixation. After dehydration and embedding in Epon 812, thin vertical and horizontal sections were obtained on an LKB ultratome. The sections were stained in uranyl acetate and studied in an electron microscope. A series of photographs illustrate the stereocilia and kinocilium. The structural organization of the sensory hairs is mainly characterized by the presence of one kinocilium and from 40 to 110 stereocilia on each sensory cell. The apparent stiffness and low metabolic activity of the stereocilia suggest their mechanical transmitter function between the otolithic membrane and the sensory cells. D. P. F.

A65-25241
ON THE ASSIMILATION OF ENERGY FROM INORGANIC SOURCES IN AUTOTROPHIC FORMS OF LIFE.
Lutz Kiesow (National Naval Medical Center, Naval Medical Research Institute, Bio-Energetics Laboratories, Bethesda, Md.).
National Academy of Sciences, Proceedings, vol. 52, Oct. 1964, p. 980-988. 17 refs.
NASA Contract No. R-38.

An investigation of the assimilation of energy by Nitrobacter winogradskyi Buch, grown at 35°C in a purely organic medium with addition of the required tracer elements. Energy assimilation can be studied in green cells or chemosynthetic bacteria, but the latter offer a decisive advantage in that in chemoautotrophs the assimilation is inseparably linked to a transformation of chemical "individuals" and is accessible to chemical analysis and to equilibrium considerations. The source of energy in Nitrobacter winogradskyi is the oxidation of nitrite to nitrate. The experimental results of the anaerobic "back reaction" are described. Aerobic oxidation was also observed, and reduction of the pyridine nucleotide by NO_2^-. A discussion of the experimental results indicates that the biological assimilation of CO_2 would be thermodynamically impossible without a simultaneous or preceding assimilation of energy. D. P. F.

A65-25243
CATALYTIC DECOMPOSITION OF GLUCOSE IN AQUEOUS SOLUTION BY THERMAL PROTEINOIDS.
Sidney W. Fox and Gottfried Krampitz (Florida State University, Institute for Space Biosciences, Tallahassee, Fla.).
Nature, vol. 203, Sept. 26, 1964, p. 1362-1364. 18 refs.
Grant No. NsG 173-62.

Experimental investigation of the catalytic decomposition of ^{14}C-glucose in aqueous solution by thermal proteinoids, which result from the condensation of the 18 amino acids common to protein, in an initially dry state. Proteinoids are thermal polymers which readily form membranous microparticles and have nutritive value for animal organisms. A sample of 100 mg of a 2:2:1-proteinoid dissolved in 50 ml of redistilled water was incubated at 37.5°C for 72 hours with 10 μc of ^{14}C-glucose freshly purified by chromatography. The reaction mixture was maintained under a slow stream of prepurified nitrogen, and the gas was passed through saturated $Ba(OH)_2$; the latter, acting as a CO_2 trap, was replaced after 1, 2, 3, 6, 12, 24, 48, and 72 hr. Carrier $Ba(OH)_2$ was added to each trap, and total carbonate was collected on Whatman No. 50 filter paper, after complete precipitation. Radioactivity was estimated in a gas-flow beat detector. Controls without proteinoid and others without glucose were run. $^{14}CO_2$ evolution is illustrated by a graph. Other sugars such as (radio) fructose and (radio) sucrose also yielded $^{14}CO_2$, but in smaller proportions than (radio) glucose. The finding of catalytic activities for natural substrates and of integrated nutritive qualities in thermal proteinoids entitles them to be considered both as synthetic general protein and as a model of primitive abiotic protein. D.P.F.

A65-25245 #
ON THE HORSEPOWER OUTPUT OF HUMAN BEINGS.
Berl W. Owens (Washington, University, Dept. of Mechanical Engineering, Seattle, Wash.).
Trend in Engineering, vol. 17, Apr. 1965, p. 7-10, 32. 6 refs.

An experimental investigation to determine the fractional horsepower output of average human beings over an extended period of time, as applied to mechanical cranking. Students in a senior course in machine design at the university level were asked to design a crank-driven fan; in order to optimize the crank length and the rpm at which the device would operate and to determine other operating parameters it became necessary to find the effective horsepower output of a human being. Experimental techniques were developed relating the rate of heartbeat with the amount of useful work produced by any given mode. This criterion is effective, since heartbeat, up to about 115 beats per minute, varies linearly with oxygen consumption. It was found that temperature, humidity, and noise level affect the individual's capacity for work. The load simulator consisted of a 1/6 hp, 115-v, de generator, with a 0 to 200-ohm adjustable load circuit and a 0 to 150-w wattmeter. Torque could be varied by controlling the field strength through a 0 to 200-ohm resistor and the load. Crank length was adjustable from 7 to 20 inches. Sustained output, using a 14-in. crank at 35 rpm, gave an indicated output of only 0.0345 hp. Pedaling produced 0.113 hp. D. P. F.

A65-25323 #
CONTROLLABILITY LIMIT OF A HUMAN PILOT.
Kyuichiro Washizu and Katsuyuki Miyajima (Tokyo, University, Tokyo, Japan).
AIAA Journal, vol. 3, May 1965, p. 941-947. 10 refs.

Theoretical analysis of the limit of a human pilot's capability in controlling an unstable second-order system which is called an element. The transfer function of the human pilot is assumed, and the stability boundary of the closed system consisting of the human pilot and the controlled element is analyzed. The boundary thus obtained is considered to suggest the theoretical controllability limit of the human pilot. In connection with the theoretical analysis, fixed-base flight simulator tests are conducted; the analogous controlled element is set in the simulator and the controllability limit is investigated by an experienced pilot. The physical interpretation of the experimental data with respect to the theoretical results shows good insight into the controllability limit of the human pilot. (Author) B. B.

A65-25418 #
MICROBIAL CONTAMINANTS IN THE INTERIORS OF SPACECRAFT COMPONENTS.
John B. Opfell and William Bandaruk (Philco Corp., Aeronutronic Div., Newport Beach, Calif.).
COSPAR, International Space Science Symposium, 6th, Buenos Aires, Argentina, May 13-19, 1965, Paper. 46 p. 30 refs.

Discussion of techniques for evaluating the sterility against gross microbiological contamination of components of planetary-impacting spacecraft. It is found that the nature of the material inspected has a great effect on the sensitivity of the detection method. By culturing abraded particles, a bacillus inoculum of 100 spores/ml can be detected in solid propellants. About 50% of an inoculum can be recovered from some solids which are soluble in nontoxic solvents. However, for many of the solids studied, the culturing techniques used were unable to detect inoculums of 10^6 spores/ml of solid. Techniques other than culturing could not discriminate between living and dead cells. When a sensitive final-product sterility test is not available, assurance of sterility depends upon other information, such as the manufacturing history of the product. P. K.

A65-25550 #
CONCERNING THE MODIFICATIONS IN ANAPHASE MITOSIS CAUSED BY MECHANICAL VIBRATIONS [NOTE SUR LES ALTERATIONS DE L'ANAPHASE PROVOQUEES - PAR LES VIBRATIONS MECANIQUES].
R. Loubiere, P. Grognot, and F. Violette.
COSPAR, International Space Science Symposium, 6th, Buenos Aires, Argentina, May 13-19, 1965, Paper. 4 p. In English and French.

Discussion of the effects of mechanical vibrations on mitosis, as observed in neoplastic ascitis cells injected into mice. The frequency of vibration was 70 cps, the vibration amplitude 4/10 mm, and the time during which the mice were exposed to vibration ranged from 7 to 30 minutes. The test mice were thoroughbred, of Swiss origin, and weighed more than 25 g on innoculation. The mice were vibrated six days after innoculation, which corresponds to the phase of exponential tumor growth. They were then sacrificed and the ascitis liquid was stained and fixed with Carnoy's liquid. Mitosis count was effected by a fluorescence method, using acridine orange as the fluorochrome. Abnormal anaphase mitosis was observed in 42.3% of the animals that had been vibrated for 15 minutes, as compared with 13.6% for the control animals. The abnormal anaphase rate is fairly constant within the 7 to 30-minute vibration range. D. P. F.

A65-25551 #
PHYSIOLOGICAL EFFECTS OF GRAVITATION [FIZIOLOGICHESKIE EFFEKTY GRAVITATSII].
O. G. Gazenko and A. A. Giurdzhian (Akademiia Nauk SSSR, Otdelenie Fiziologii; Komissiia po Issledovaniiu i Ispol'zovaniiu Kosmicheskogo Prostranstva, Moscow, USSR).
COSPAR, International Space Science Symposium, 6th, Buenos Aires, Argentina, May 13-19, 1965, Paper. 38 p. 60 refs. In Russian.

Review of what is known concerning the effects of weightlessness on man. Much of the material is drawn from the flights of Voskhod 1 (1964 64A, with Komarov, Feoktistov, and Egorov) and Voskhod 2 (March 18, 1965, with Leonov and Beliaev). Graphs of the pulse and respiration rates of Leonov and Beliaev for the 1st to 17th orbits and during the 24 min of the first walk in space are included. W.M.R.

A65-25645
CONTRIBUTIONS TO SENSORY PHYSIOLOGY. VOLUME I.
Edited by W. D. Neff (Indiana University, Psychology Dept., Bloomington, Ind.).
New York, Academic Press, Inc., 1965. 274 p.
$7.50.

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PREFACE. W. D. Neff (Indiana University, Bloomington, Ind.), p. vii.

CELLULAR PATTERN, NERVE STRUCTURES, AND FLUID SPACES OF THE ORGAN OF CORTI. Hans Engström (Göteborg, University, Göteborg, Sweden), Harlow W. Ades (U.S. Naval School of Aviation Medicine, Pensacola, Fla.), and Joseph E. Hawkins, Jr. (Göteborg, University, Göteborg, Sweden; Michigan, University, Ann Arbor, Mich.), p. 1-37. 52 refs. [See A65-25646 15-04]

FUNCTIONAL ANATOMY OF THE VESTIBULAR AND LATERAL LINE ORGANS. Jan Wersäll and Åke Flock (Royal Caroline Institute of Medicine and Surgery; King Gustav V Research Institute, Stockholm, Sweden), p. 39-61. 49 refs. [See A65-25647 15-04]

PSYCHOPHYSIOLOGICAL STUDIES OF VESTIBULAR FUNCTION. Fred E. Guedry, Jr. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.), p. 63-135. 163 refs. [See A65-25648 15-04]

BEHAVIORAL AND ELECTROPHYSIOLOGICAL STUDIES OF PRIMATE VISION. Russell L. De Valois (Indiana University, Bloomington, Ind.), p. 137-178.

VISION IN INTERMITTENT LIGHT. H. Piéron (Collège de France, Paris, France), p. 179-264.

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A65-25646
CELLULAR PATTERN, NERVE STRUCTURES, AND FLUID SPACES OF THE ORGAN OF CORTI.
Hans Engström (Göteborg, University, Dept. of Otology, Rhinology, and Laryngology, Göteborg, Sweden), Harlow W. Ades (U.S. Naval School of Aviation Medicine, Dept. of Neurophysiology and Acoustics, Pensacola, Fla.), and Joseph E. Hawkins, Jr. (Göteborg, University, Dept. of Otology, Rhinology, and Laryngology, Göteborg, Sweden; Michigan, University, Kresge Hearing Research Institute, Ann Arbor, Mich.).
IN: CONTRIBUTIONS TO SENSORY PHYSIOLOGY. VOLUME I. Edited by W. D. Neff.
New York, Academic Press, Inc., 1965, p. 1-37. 52 refs.
Research supported by the Swedish Medical Research Council; Navy Contract No. 62558-263; National Institutes of Health Grant No. OH-93.

Description and illustrations of the cellular pattern of the neuroepithelium with special attention to the sensory cells, neural structure, and fluid spaces of the organ of Corti. Experimental techniques using the electron microscope and phase contrast microscopy to investigate the organ of Corti and other structures of the inner ear are discussed. The cytoarchitecture and structure of the cochlear hair cells are described; microphotographs illustrate the degenerative effects of ototoxic antibiotics and intense noise. The morphology of the nerve structures in the organ of Corti is investigated, with many microphotographs as supporting material. The function of the liquid contained within the organ of Corti is considered in the light of its chemical composition to be a separate entity enclosed within a "discrete, sealed system of communicating spaces" to which the name cortilymph was given. There is no evidence, based upon recent experimental work, that any definite communication exists between the cortilymph and the perilymph. D. P. F.

A65-25647
FUNCTIONAL ANATOMY OF THE VESTIBULAR AND LATERAL LINE ORGANS.
Jan Wersäll and Åke Flock (Royal Caroline Institute of Medicine and Surgery, Dept. of Otolaryngology and Dept. of Histology; King Gustav V Research Institute, Stockholm, Sweden).
IN: CONTRIBUTION TO SENSORY PHYSIOLOGY. VOLUME I. Edited by W. D. Neff.
New York, Academic Press, Inc., 1965, p. 39-61. 49 refs.
Research supported by the Swedish Medical Research Council, Therese and Johan Andersson's Memorial Fund, and Gustav and Tyra Svensson's Memorial Fund, and National Institutes of Health.

Description of the morphological features and functional anatomy of the vestibular and lateral line organs of equilibrium in animals. The orientation of the sensory hair bundles is described. In accordance with the proposition of Lowenstein and Wersäll (1959), it is suggested that the response of the hair cell is determined by the direction from which the stimulus approaches the hair cell. Experimental evidence is given indicating the antagonistic nature of cupular displacement in the lateral line organ where two groups of cells are oriented in opposite directions. Two groups of fibers were found, one responding with increased impulse frequency to headward direction of stimulation and decreased frequency to tailward stimulation, with the other group acting inversely. Different cell types and patterns of inervation are described; it would appear that Type I hair cells inervated by large nerve chalices are more differentiated, highly sensitive cells and that the less specialized and diffusely disposed Type II cells may provide information of a general character. D. P. F.

A65-25648
PSYCHOPHYSIOLOGICAL STUDIES OF VESTIBULAR FUNCTION.
Fred E. Guedry, Jr. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).
IN: CONTRIBUTIONS TO SENSORY PHYSIOLOGY. VOLUME I. Edited by W. D. Neff.
New York, Academic Press, Inc., 1965, p. 63-135. 163 refs.

Investigation of the responses associated with ampullar stimulation in human beings with particular attention to the responses elicited by rotation of the subjects and by exposure of them to linear velocities and accelerations. An analogy is worked out between the cupula-endolymph system and a heavily damped torsion pendulum by which it should be possible to predict the system's behavior if the value of the physical coefficients were known and the differential equations applied. Experimental evidence demonstrates that responses to stimuli are predictable and consistent when dealing with stimuli which are approximately the same as those found under normal living conditions. The sensations of rotation and nystagmus

induced by vestibular excitation tend to follow similar courses even during unnatural stimulation, but extravestibular arousal may yield marked divergence of these two responses. The otolith system may provide linear velocity information, as experimentally demonstrated by the behavior of subjects on a parallel swing. The Coriolis vestibular reaction is described, and the role of time on arousal influence is discussed. Habituation responses are considered in the light of experimental evidence relative to subjects in a rotating room. D. P. F.

A65-25856

EFFECTS OF SEVERAL MENTAL TASKS ON AUDITORY FATIGUE.

William E. Collins (Federal Aviation Agency, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.) and Mary Jayne Capps (Illinois, University, Dept. of Psychology, Urbana, Ill.).

Acoustical Society of America, Journal, vol. 37, May 1965, p. 793-796. 9 refs.

Study to provide further evidence concerning the effects on temporary threshold shift (TTS) of mental arithmetic (MA) and reverie (REV) during periods of low-level auditory fatigue, to compare with MA and REV the effect on TTS of a different mental task (written long division - LD), and to examine the influence on TTS of attending to other auditory stimuli during the fatigue period. Eight male subjects were exposed for three min to a 4000-cps fatigue tone at 40-db SL. Each subject was tested under four task conditions: MA, LD, threshold determination (TD) on a 500-cps tone, and REV. Temporary threshold shifts (TTSs) were computed by comparing pre- and postfatigue thresholds. MA produced significantly more TTS than any other condition, and LD resulted in greater shifts than REV. The amount of auditory fatigue can vary with the type of mental activity performed by the subject. F. R. L.

A65-25911

IMMUNOADSORBENT FOR THE ISOLATION OF PURINE-SPECIFIC ANTIBODIES.

H. H. Weetall and N. Weliky (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).

Science, vol. 148, May 28, 1965, p. 1235-1237. 10 refs.

Description of the synthesis of an immunoadsorbent for isolating purine-specific antibodies from blood serum. The technique used can be applied to isolate antibodies to any purine or pyrimidine capable of being converted to a derivative which can be coupled to amine groups. The recovery of antibody from a serum sample is better than 82%, and the precipitability of the isolated antibody is as a high as 89%. (Author) P. K.

A65-25914 #

SOME DEVELOPMENTS IN STERILIZATION FOR PLANETARY PROBES.

Oran W. Nicks and James R. Miles (NASA, Office of Space Science and Applications, Lunar and Planetary Div., Washington, D.C.).

COSPAR, International Space Science Symposium, 6th, Buenos Aires, Argentina, May 13-19, 1965, Paper. 46 p.

Review of studies on the development of materials, equipment, and procedures for the design, development, and testing of a sterilized planetary spacecraft. Procedures for ensuring clean component manufacture and hardware assembly, overall spacecraft sterility, and the postassembly sterility needed to prevent recontamination during final checkout, launch, and exit from the Earth's atmosphere are discussed. The results of studies on the sterilizability of various electronic components, electronic modules and processes, electrical connections, tape recorders, parachute materials, structural and mechanical elements, parts for scientific instruments, spot coolers, batteries, and the propellants for onboard retro units are described. P. K.

A65-25991

HUMAN VIBRATION LIMITS.

Sam Barnes.

Machine Design, vol. 37, June 10, 1965, p. 144-149.

Study of human subjective reaction to whole-body vibration. The problem is considered important because modern transportation systems (space boosters, spacecraft during re-entry, high-performance jet aircraft) impose vibratory loads which are sometimes uncomfortable and occasionally harmful. In experimental investigation men have been placed on shaketables, and experimenters have worked at learning more about the nature of human and animal bodies. Low frequencies have been found to be the most critical. Vibration tolerance is affected by posture, shape and size of the man, and his physical condition. A study by Boeing indicates that a certain amount of heat, noise, and vibration frightens men into better performance. F. R. L.

A65-26000

AIRCRAFT ACCIDENT PATHOLOGY - A STUDY IN COOPERATION.

J. K. Mason (Royal Air Force, Institute of Pathology and Tropical Medicine, Halton, Bucks., England).

(Association of Military Surgeons of the United States, Annual Meeting, 71st, Washington, D.C., Oct. 20-22, 1964.)
Military Medicine, vol. 130, June 1965, p. 578-585. 14 refs.

Demonstration that the pathologist's contribution to aircraft accident investigation is greatest when it is carried out in cooperation with police and other local authorities, the coroner, the board of inquiry, the deceased's physicians, other medical colleagues, the research laboratory, and international authorities. It is considered that the standing of a pathologist depends on his efficiency and on the degree of effort he will make to improve his contribution to an investigation by backing autopsy findings with ancillary nonmedical observations, which should preferably be personal. F. R. L.

A65-26142 #

THE TRANSMISSION OF STIMULI IN NERVES [DIE ERREGUNGSLEITUNG IM NERVEN].

Robert Stämpfli (Saarland, Universität, Physiologisches Institut, Saarbrücken, West Germany).

Bild der Wissenschaft, vol. 2, May 1965, p. 357-367. In German.

Discussion of the mechanism and principles which govern the transmission of nerve stimuli in man and animals, with a description of the structure of the neurons. Axons can be classified into two types, medullated and nonmedullated. Nonmedullated axons are composed of a central tube filled with axoplasma measuring up to a maximum of 10^{-3} mm in diam., surrounded by a myelin sheath (composed of lipoids and proteins) which is only 7.5×10^{-6} mm in diam. and which acts as an insulator. The axoplasm has a K^+ ion concentration some 20 to 50 times higher than that existing in the extracellular medium, while the latter has an Na^+ ion concentration some 10 to 40 times higher than that in the axoplasm. A stimulus applied to a dendrite causes an abrupt change in the static cell ion equilibrium, whereby K^+ ions flow through the myelin membrane to the extracellular medium and Na^+ ions flow from the latter into the axoplasm; a potential difference is thus established. The speed of stimulus transmission is a maximum of 2 m/sec for the nonmedullated cells but is of the order of 100 m/sec for the medullated ones. In general the speed of transmission varies as the square of the area of the axon. Transmission in medullated cells is pulsed, from Ranvier node to Ranvier node. Distance between nodes is from 1 to 2 mm. D. P. F.

A65-26163

TOXICOLOGY OF BORON COMPOUNDS.

George J. Levinskas (American Cyanamid Co., Princeton, N.J.).

IN: BORON, METALLO-BORON COMPOUNDS AND BORANES. Edited by R. M. Adams.
New York, Interscience Publishers, 1964, p. 693-737. 182 refs.

Investigation of the toxic effects of boron compounds on plants, animals, and human beings. Experimental laboratory data indicate that boric acid and borax are only slightly toxic compounds. Organoboron compounds show a range of toxicities from slightly to very toxic; the more toxic appear to be particularly irritant to the eyes. Boron hydrogen compounds are approximately 100 times more toxic than the organoborons, and pentaborane was found to be the most toxic of the boron hydrides. Experience, however, has shown that boron hydride fuels can be handled safely if adequate protective measures are taken. A monitoring procedure to measure air levels of boron hydrides and a clinical test for measuring overexposures and their severity are needed. The results of extensive laboratory tests on animals are described for three groups of boron compounds - boric acid and borax, organoboron compounds, and boron hydrides of the types used as rocket propellants. D. P. F.

A65-26164
ULTRASTRUCTURE OF THE OTOLITH ORGANS IN SQUIRREL MONKEYS AFTER EXPOSURE TO HIGH LEVELS OF GRAVITOINERTIAL FORCE.
Heinrich H. Spoendlin (Zürich, Universität, Otorhinolaryngologische Klinik and Poliklinik; Zürich, Kantonsspital, Zurich, Switzerland), Harold F. Schuknecht (Harvard University, Medical School, Dept. of Otolaryngology, Boston, Mass.), and Ashton Graybiel (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).
Aerospace Medicine, vol. 36, June 1965, p. 497-503. 32 refs.
NASA-supported research.

Results of exposing eleven squirrel monkeys to gravitoinertial force of either 5.43 or 10.92 g units for periods up to 10 min in different body (head) positions. Three animals died. The nature of the head support was believed to be responsible in two, and headward (negative) acceleration in the other. Gross examination of the brains revealed no pathological changes. Following centrifugation some of the monkeys manifested ataxia and other disturbances which disappeared in minutes or hours. Human subjects have experienced some of the manifestations following high-g loadings. The ultrastructure of the maculae, as revealed by electron microscopy, was not altered in any of the animals exposed to high-g stress. It was concluded that exposure to gravitoinertial forces greater than 10.92 g units is necessary before physical alterations in fine structures of the macula can be demonstrated in squirrel monkeys. The possibility was not ruled out that the clinical manifestations had their genesis in the semicircular canals. If the g loadings in this experiment are not exceeded in orbital space flights, alterations of the macula would be ascribable to other causes, including the prolonged deafferentation associated with weightlessness. (Author) F.R.L.

A65-26165
HEART RATE PATTERNS OBSERVED IN MEDICAL MONITORING.
David G. Simons and Robert L. Johnson (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Flight Medicine Branch and Internal Medicine Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 36, June 1965, p. 504-513. 23 refs.
NASA-supported research.

Observation of records of heart rate from several hundred individuals under a wide variety of aerospace flight-stress situations including sleep, quiet wakefulness, clinical stress testing, simulated aircraft flight, and F-100 aircraft flight. Automated beat-by-beat heart-rate analysis recorded at 1 mm/sec clearly demonstrated a variety of heart-rate patterns. Base heart-rate values which reflected homeostatic levels were distinguished from heart-rate reflex activity identified as transient disruptions of homeostasis. Reflex patterns were divided into respiratory heart-rate and slow-wave heart-rate reflex activity. Slow waves were identified as cardioaccelerator, balanced, and cardiodecelerator waveforms. Physiological mechanisms contributing to the observed heart-rate reflex patterns are discussed. (Author) F.R.L.

A65-26166
THE FLIGHT RESEARCH PROGRAM. I - LONG-RANGE PROGRAM TO DEVELOP MEDICAL MONITORING IN FLIGHT.
James Roman (NASA, Flight Research Center, Office of Biological Research and Medical Operations, Edwards, Calif.).
Aerospace Medicine, vol. 36, June 1965, p. 514-518.

Description of a long-range program conducted by the NASA Flight Research Center which is designed to advance the state of the art in biomedical monitoring. Better knowledge of the physiological parameters used in monitoring the crew is one of the major aims of the program. An instrumentation development phase and a phase involving development of computer techniques for handling medical flight data both contribute to the overall program. The physiological parameters research phase and the instrumentation development phase are considered to have yielded significant results after one year of operation. (Author) F.R.L.

A65-26167
THE FLIGHT RESEARCH PROGRAM. II - RISK AND RESPONSIBILITY AS FACTORS AFFECTING HEART RATE IN TEST PILOTS.
James Roman (NASA, Flight Research Center, Office of Biological Research and Medical Operations, Edwards, Calif.).
Aerospace Medicine, vol. 36, June 1965, p. 518-523. 8 refs.

Comparison of physical risk and responsibility for the mission as factors in modulating heart rate in a group of test pilots. In 37 flights in a two-place high-performance aircraft, or 35 hr of instrumented flying time, physical risk or danger did not appear to be a primary causative factor in producing the high heart rates frequently seen in high-performance vehicle operation. Responsibility for the mission appeared to be a more potent factor. It is recognized that the responsibility factor is not clearly defined and encompasses many variables. (Author) F.R.L.

A65-26168
INFLUENCE OF BEDREST ON PLASMA LEVELS OF 17-HYDROXYCORTICOSTEROIDS.
David Cardus, Carlos Vallbona, Fred B. Vogt, William A. Spencer, Harry S. Lipscomb, and Kristen B. Eik-Nes (Baylor University, College of Medicine, Dept. of Rehabilitation, Dept. of Physiology, and Dept. of Pediatrics; Texas Institute for Rehabilitation and Research, Houston, Tex.; Utah, University, College of Medicine, Dept. of Biological Chemistry, Salt Lake City, Utah).
Aerospace Medicine, vol. 36, June 1965, p. 524-528. 12 refs.
Contracts No. NAS 9-1461; No. NAS 9-1294.

Determination of plasma levels of 17-hydroxycorticosteroids at 0800, 1200, 1600, 2000, and 2400 hr on six healthy subjects who were submitted to two three-day periods of bed rest. During the first period the subjects were in bed rest only. During the second a program of isometric exercises was added. The determinations of 17-hydroxycorticosteroids in plasma were made with a modification of the Peterson method and the Porter-Silber technique. During bed rest the peak level at 0800 seemed a little lower than the peak values observed while the subjects were ambulatory, but the difference was not statistically significant. Rest did not modify the circadian rhythm of 17-hydroxycorticosteroids in plasma. During the period that isometric exercises were added to bed rest the rhythm and the levels of 17-hydroxycorticosteroids were normal. One to two days' bed rest has no effect on the circadian rhythm of 17-hydroxycorticosteroids. (Author) F.R.L.

A65-26169
NATURE OF RADIATION FROM NUCLEAR WEAPONS IN RELATION TO FLASHBLINDNESS.
J. H. Hill and Gloria T. Chisum (U.S. Naval Air Development Center, Aviation Medical Acceleration Laboratory, Johnsville, Pa.).
Aerospace Medicine, vol. 36, June 1965, p. 528-532.

Attempt to provide guidelines for the investigation of flash-blindness. The minimum information about a weapon flash necessary for research and development purposes in regard to the problem is luminance, duration, and visual angle subtended by the source, whether it is a fireball or a surface illuminated by the fireball. The estimation of these parameters from information given in the Dept. of the Army Pamphlet 39-3, "The Effects of Nuclear Weapons," is discussed. (Author) F.R.L.

A65-26170
DYNAMIC SIMULATION OF THE A4D FLASH BLINDNESS PROTECTIVE SYSTEM.
Gloria T. Chisum and J. H. Hill (U.S. Naval Air Development Center, Aviation Medical Acceleration Laboratory, Johnsville, Pa.).
Aerospace Medicine, vol. 36, June 1965, p. 533-537.

Evaluation of the A4D thermal protective system, which consists of a buggy-top thermal enclosure and ELF goggles (an explosive shutter consisting of a double lens with a chamber between) under acceleration stresses of 1.2 to 5 g. Five experienced pilots and three nonpilot subjects operated the system within empirically predetermined limits of safety. All subjects were within the 5th to 95th percentile size range of U.S. Navy pilots. Subjects in the lower third of the size range exhibited greater facility in operation of the system than those in the upper two-thirds of the size range. It is concluded that under the conditions described pilots of A4D aircraft will be able to use the thermal shield-ELF flash blindness protective system and maintain safe operation of the aircraft. (Author) F.R.L.

A65-26171
FUNCTIONAL STATES OF ALTERED AWARENESS DURING FLIGHT.
Don E. Flinn (USAF, Office of the Surgeon General, Washington, D.C.).
Aerospace Medicine, vol. 36, June 1965, p. 537-544. 29 refs.

Discussion of transient states of altered awareness not organic or physiological in origin, which are occasionally seen in air crew members. These include lapses of attention, trance states, dream-like states, and related subjective experiences. These are often minor disorders of the type which in a more severe form are known

clinically as dissociative reactions. Various factors are implicated in their onset, including the monotonous aspects of the flying environment, anxiety, fatigue, sensory overload, narrowed attention and underlying psychopathology in the individual. In the past seven years 21 patients have been referred to the USAF School of Aviation Medicine because of episodes of this type. While these conditions are not always a significant threat to flying safety it may be difficult to differentiate them from disorders which are. Decisions regarding return to flying status in these cases must be made individually, based on the demonstrated degree of interference with performance and the underlying emotional suitability of the individual. F.R.L.

A65-26172

DEVELOPMENT OF A TRITIUM SELF-LUMINOUS LIFE RAFT LIGHT SOURCE.

Ernest B. McFadden, J. D. Garner (Federal Aviation Agency, Civil Aeromedical Research Institute, Oklahoma City, Okla.), and R. A. Masler (United States Radium Corp., Morristown, N.J.).

Aerospace Medicine, vol. 36, June 1965, p. 548-551.

Description of a self-luminous light source utilizing tritium gas (a radioactive isotope of hydrogen) and a zinc sulfide phosphor. The source is primarily designed to provide survivors emerging from a ditched aircraft with a visible identification of the location and attitude of the life raft and boarding stations. Two sizes of tritium light sources were designed and tested. Eight 3-in. sources, of 425 μlambert each of brightness, were fabricated for use on the periphery of a 25-man life raft. Two 6-in. sources of 225 μlamberts each were fabricated for use at the boarding station. Special geometry of the sources allows visibility angles in excess of 180°. Emission of visible light is continuous and not dependent on an external source of energy. Reduction in brightness is a function of the half-life of tritium (12.6 yr). The use of self-luminous safety devices utilizing tritium is approved by the AEC and is considered to present no radiation hazard. (Author) F.R.L.

A65-26173

FATIGUE-STUDIES ON OVERSEAS FLIGHTS.

H. Bruener, K. E. Klein, S. Ruff, and H. M. Wegmann (Deutsche Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany).

(International Congress of Aviation and Space Medicine, 13th, Dublin, Ireland, Sept. 14, 1964.)
Aerospace Medicine, vol. 36, June 1965, p. 552, 553. 14 refs.

Studies on aircrew personnel during flights from Frankfort to New York and return. A natural depression of the circulatory parameters in the diurnal fluctuation during the night hours was found, considered to be probably caused by vagotonia. A depression found after long hours of mental work should have the same cause, a relative vagotonia, and should be an expression of a state of relative fatigue. It is believed that this interpretation would best explain and agree with the results obtained with other physiological parameters. (Author) F.R.L.

A65-26174

RESPONSE TO CARBOHYDRATE LOADING AS A CRITERION IN COMMERCIAL PILOT SELECTION.

G. F. Catlett and G. J. Kidera (United Air Lines, Inc., Medical Dept., Chicago, Ill.).

Aerospace Medicine, vol. 36, June 1965, p. 554-557. 13 refs.

Evaluation of the feasibility of screening latent diabetes by use of a single blood glucose determination after administration of a loading dose of carbohydrate and comparison of this method with the traditional random urinalysis. The procedure was performed on 157 applicant pilots who were without history of metabolic disease and whose initial urines were sugar-free. Seventeen of the group showed glycosuria after loading, and of these seven demonstrated sufficient carbohydrate intolerance to warrant rejection. It is considered that the random urinalysis appears inadequate as a selection test and should be replaced by some evaluation of glucose tolerance. (Author) F.R.L.

A65-26175

LAKEFRONT AIRPORT - AN EPIDEMIOLOGIC APPROACH.

John D. Dougherty (Harvard University, School of Public Health, Cambridge, Mass.).

Aerospace Medicine, vol. 36, June 1965, p. 558-561. 7 refs.

Epidemiological evaluation of New Orleans Lakefront Airport for information of physicians. The unique location of this airport makes spatial disorientation a common occurrence to aircraft in the traffic pattern at night and in reduced visibility. Proficiency varied widely among pilots involved in fatal crashes. Several common factors, such as low visibility, darkness, and type of aircraft, are considered. Traffic pattern operations by a noninstrumented pilot indicated a method by which coriolis may be induced in the pattern. Two accidents, typical of spatial disorientation, are noted, as was the high fatality rate for night operations for this airport. It is suggested that local aviation medical examiners are ideally equipped to compile and analyze longitudinal studies of airport safety. (Author) F.R.L.

A65-26257

THE SPACE SUIT.

Bernard Kovit.

Space/Aeronautics, vol. 43, June 1965, p. 43-49.

Discussion of problems involved in the design of extravehicular space suits. The greatest difficulties are found to arise in connection with resolving mobility and comfort needs, not in countering environmental stresses. Two approaches to the problem of mobility are outlined, one involving the mobilization of the joints alone with the rest of the body area being restrained, while the other provides a degree of flexibility throughout the body. Examples of each approach are cited. Problems connected with the design of the back pack and the power tools of an astronaut in space are touched upon. A.B.K.

A65-26273

NEW CELLULOSE DERIVATIVES FOR THE ISOLATION OF BIOLOGICALLY ACTIVE MOLECULES.

H. H. Weetall and N. Weliky (California Institute of Technology, Jet Propulsion Laboratory, Space Science Div., Pasadena, Calif.).

Nature, vol. 204, Nov. 28, 1964, p. 896, 897.

Investigation of methods of isolating antibodies from serums with the aid of new cellulose derivatives. The use of dicyclohexylcarbodiimide as a coupling agent for chemically binding antigenic substances with basic amino groups to insoluble varieties of carboxymethylcellulose is cited, recovery of antibody complexed to the cellulose derivatives being in excess of 88%. Overall yields exceeding 90% are said to have been obtained from anti-BAS serum and anti-azophenylarsonate serum by dissociating the antigen-antibody complex with 1% saline acidified with HCl. A method of synthesizing a new arylaminocellulose is described, in which benzidine is coupled to carboxymethylcellulose by adding a tetrahydrofuran solution of dicyclohexylcarbodiimide. An immunoadsorbent was prepared by diazotizing this arylaminocellulose and coupling it to bovine serum albumin, subsequent treatment with β-naphthol blocking any unreacted diazonium groups. In reactions between this immunoadsorbent and rabbit antibovine serum albumin, the isolated antibody was found to be no less than 80% precipitable with specific antigen. In experiments using a nonspecific rabbit serum, the quantity of nonspecific protein eluted from an immunoadsorbent made from a carboxymethylcellulose derivative was compared with that eluted from an immunoadsorbent made from a p-aminobenzyl derivative. The retention and release of nonspecific protein on these immunoadsorbents are thought to be dependent on the number of β-naphthyl groups present. The new arylaminocellulose is found to retain about twice the quantity of nonspecific protein as the p-aminobenzylcellulose, although it is thought that nonspecific protein adsorption can be reduced by reducing the number of benzidine groups. A.B.K.

A65-26285

DETECTION OF MICRO-ORGANISMS IN SOIL BY THEIR CATALATIC ACTIVITY.

H. H. Weetall, N. Weliky, and S. P. Vango (California Institute of Technology, Jet Propulsion Laboratory, Space Sciences Div., Pasadena, Calif.).

Nature, vol. 206, June 5, 1965, p. 1019-1021. 16 refs.

Method of detecting and estimating intracellular catalase, an enzyme which catalyzes the decomposition of hydrogen peroxide to water and oxygen, as a simple and convenient indicator of the presence of microorganisms in soils. Catalase is prevalent in microorganisms, and its activity is insensitive to reaction conditions. To determine the concentrations of intracellular catalase which might be found in various desert soils, the quantity of enzyme found in an "average bacterium" was estimated. The principle of the method was tested by placing equal weights of soil samples in the bottom of

each of two test tubes. Buffer was added to the control side and muramidase in an equal volume of buffer to the other. After allowing 20 min for the muramidase to react, the upper reagent vessels were turned so that the hydrogen peroxide solution, previously measured into each, was poured into the test tubes. If the muramidase released catalase, the excess oxygen produced from the hydrogen peroxide increased the pressure on that side, causing the liquid in an interconnecting U-tube to move. This was found to be the case for a garden soil and several desert soils. It is considered that the technique, which has been refined in a manner described, should be applicable to the detection of any enzyme which produces a gas such as carbon dioxide or oxygen. F.R.L.

A65-26302 #

EFFECTS OF HIGH-FREQUENCY ELECTROMAGNETIC FIELDS ON THE INTAKE OF METHIONINE S35 BY THE SPLEEN AND LIVER OF MICE [ACTION DES CHAMPS ELECTROMAGNETIQUES HYPERFREQUENCES SUR L'INCORPORATION DE LA METHIONINE 35 S PAR LA RATE ET LE FOIE CHEZ LA SOURIS].

L. Miro, R. Loubière, and A. Pfister (Ecole Pratique des Hautes Etudes, Laboratoire de Biologie Aérospatiale; Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France).

International Symposium on Basic Environmental Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 25. 8 p. In French.

Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization. Research supported by the Ministère des Armées.

Investigation of the excitation of the cellular metabolism which occurs in the spleen and liver of mice when subjected to high-frequency electromagnetic fields. Two groups of mice were used in the experiment. The first was exposed for 160 hr to a pulsed high-frequency electromagnetic field, the average power of which was equal to 20 mw/cm^2 and the peak instantaneous power to 400 mw/cm^2; the second was used as a control group. After radiation, an intraperitoneal injection of methionine S35 was given to each animal. Sixteen hr later the mice were decapitated, an autopsy was made, and the liver and spleen removed according to classical techniques. Histautoradiographic and histophotometric techniques were used to determine the intake of methionine in the liver, the germinative centers, the reticulohistiocytic areas, and the red pulp of the spleen. The presence of amino acids was found to be much greater in the animals exposed to the radiation than in the control group. The increase of protid synthesis in the liver and spleen, combined with the pathological aspects of reticular hyperplasia found in other organs, indicates that the high-frequency magnetic fields have an exciting effect on the reticulohistiocytic system. D. P. F.

A65-26338

ELECTROCORTICOGRAPHICAL ACTIVITY IN DIFFERENT PHASES OF FLIGHT IN AIRCRAFT AND ROCKETS [ACTIVITE ELECTROCORTICOGRAPHIQUE LORS DES DIFFERENTES PHASES DU VOL EN AVION OU EN FUSEE].

P. Buser, G. Chatelier, J. Ginet, and R. Grandpierre (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France).

International Symposium on Basic Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 29. 11 p. In French.

Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Investigation of the effect of weightlessness on test rats and cats carried out in a series of experiments in aircraft and rockets in France. In each case the animal's electrocortical activity was registered during a flight comprising a period of weightlessness preceded by an acceleration phase. The period during which the test animals experienced weightlessness was on the order of 30 to 60 sec in aircraft and more than 5 min for French Véronique rocket flights. Slow hypersynchronic waves were observed on the cerebral cortex of the test animals, occurring in bursts of from 10 to 20 sec and resembling the drowsy stage preceding sleep. These slow waves may be ascribed to a substantial drop in the animal's degree of alertness. Two explanations are suggested - (1) the sudden decrease of sensory and proprioceptive stimuli may lead to a substantial decrease of the activity of the ascending reticular activatory system; (2) the disappearance of the habitual sensorial standards and the appearance of a new stimulus may release a supramaximal inhibition mechanism of the Pavlov type. D. P. F.

A65-26416 #

THE INFORMATIVE VALUES OF VARIOUS MODELS OF LANDING FIELD ILLUMINATION [DE INFORMATIEVE WAARDE VAN VERSCHILLENDE PATRONEN VAN LANDINGSBAANVERLICHTING].

J. Kylstra and J. Hoogerheide.

Aeromedica Acta, vol. 9, 1963-1964, p. 21-29. 6 refs. In Dutch.

Discussion of tests in which commercial pilots were required to discriminate between level flight and flight at an angle of descent by looking at a TV screen on which approach to a visual landing system was simulated by 4 patterns of light markings. The patterns were in the form of (1) one series of dots, (2) two series of dots, (3) one series of horizontal bars, and (4) two series of horizontal bars. It was found that the perception of the double series was better than that of the single series; a single series of horizontal bars was advantageous over a single series of cross bars but, surprisingly, a double series of dots was better than a double series of bars. V.P.

A65-26417 #

IMPEDANCE CHANGES IN THE HUMAN BODY, PARTICULARLY IN THE LOWER EXTREMITIES, UNDER THE ACTION OF G-FORCES [VERANDERINGEN VAN DE WISSELSTROOMWEERSTAND IN HET MENSELIJK LICHAAM, MET NAME IN DE ONDERSTE EXTREMITEITEN, TENGEVOLGE VAN DAAROP INWERKENDE G-KRACHTEN].

J. Kylstra.

Aeromedica Acta, vol. 9, 1963-1964, p. 31-44. 6 refs. In Dutch.

Description of a method for measuring blood displacement under the effect of g forces applied longitudinally to the body. The technique proposed is based on the measurement of the electrical impedance of the lower extremities, which was observed to decrease with increasing g. Onset of grayout and blackout is seen to occur from an abrupt decrease in impedance in the lower extremities accompanied by its increase in the head. The technique is thought to be promising in the determination of g tolerance. V.P.

A65-26418 #

EYE AND OTOLITHS.

A. Colenbrander.

Aeromedica Acta, vol. 9, 1963-1964, p. 45-91. 30 refs.

Study of experimental evidence bearing on the question of how the otolith organ is made to react to the gravitational force. It is noted that recently, a decision seems to have been made in favor of the oldest theory, which stated that a sliding movement of the otoliths provides adequate stimulus. Ample evidence has been provided by animal experiments, both directly through observation and manipulation of the otoliths, and indirectly through the study of freely moving fish on a centrifuge. Quantitative evidence in man is still lacking. Dynamic stimulation is not appropriate to test the static function of the otolith organ, the only adequate test stimulus being the apparent gravitational force on the human centrifuge. The counter-rolling of the eye may serve as an indication of the otolith signal if the effect of other receptors is eliminated; this can be done by relating the increase of counter-rolling to the increase of g forces. Regarding the subjective localization in the frontal plane, it is argued why the direction which is determined should be called the subjective plumbline rather than the subjective vertical. The term retinal compensation is introduced to indicate which retinal meridian conveys the impression of the subjective plumbline. It is pointed out that, from an analysis of the variance among the data, it could be shown that the retinal compensation is not influenced by the ocular torsion. The effect of the counter-rolling reflex on the subjective localization is similar to that of a passively induced movement of the eye. It has been found that retinal compensation, apart from the significant influence of the preceding position of the head, seems to be based on the otolith signal for small angles of head tilt and on nonotolith information for larger angles of head tilt. M.M.

A65-26419 #

THE EFFECT OF CHANGING THE RESULTANT LINEAR ACCELERATION RELATIVE TO THE SUBJECT ON NYSTAGMUS GENERATED BY ANGULAR ACCELERATION.

M. P. Lansberg, F. E. Guedry, Jr., and Ashton Graybiel.
Aeromedica Acta, vol. 9, 1963-1964, p. 97-122. 26 refs.

Discussion of experiments in which human subjects were subject to centripetal acceleration in various positions relative to the plane of rotation. In some positions, the planes of the semicircular canals remained unchanged relative to the plane of rotation, while the otolith system was changed relative to the tangential and centripetal components of the total acceleration deriving from the rotation. In these cases, the semicircular canals stimulated would be the same irrespective of the direction of the resultant vector deriving from gravity and the centrifugal force, if the semicircular canal system responds only to a change in angular momentum. On the other hand, the otolith system and other somesthetic receptors would be stimulated as if the body were undergoing increasing tilt as the angular velocity of the centrifuge increases. It is found that centripetal acceleration (and hence centrifugal force) increases as the product of the square of angular velocity and the radius. As angular acceleration terminates and maximum constant angular velocity is attained, the cupula, if influenced solely by change in angular momentum, would start a return movement, by virtue of its elasticity, at the exact instant that which the otolith structures and other body organs experience maximum resultant force. V.P.

A65-26420 #
THE DYNAMIC VISUAL ACUITY OF 30 SELECTED PILOTS.
L. F. W. de Klerk, J. T. Eernest, and J. Hoogerheide.
Aeromedica Acta, vol. 9, 1963-1964, p. 129-136. 15 refs.
Research sponsored by the National Defense Research Organization.

Experimental investigation of the existence of a relationship between dynamic visual acuity and flying skills such as shooting, instrument flying, night flying, and formation flying. The experimental arrangement and the operation of the equipment are represented schematically. It is noted that the experimental results confirm that there is a significant difference between dynamic and static visual acuity, as reported by Ludvigh. The fact that the experimental results showed a significant correlation between both acuity measurements is partly due to the relative low angular target velocity that was used in the experiments (a lack of significant correlation between the two is reported in studies which used substantially higher velocities) and partly to the high degree of similarity between the experimental conditions under which both acuities were tested, whereas the low correlations reported in the literature were obtained when the test conditions were generally much more dissimilar. It is pointed out that the results do not show any evidence that confirms the assumption that dynamic visual acuity, as measured, is a variable relevant for flying skill. On the other hand, this does not mean that the assumption must be rejected. First, the results might lack generality because the test conditions under which dynamic visual acuity was tested were restricted to the angular target velocity used, as well as to other experimental conditions such as exposure time, anticipatory tracking time, etc. A second reason is that only skilled pilots were tested. Restriction of range always produces a substantial decrease of correlation measurements. Therefore, this might also explain why in the authors' studies, limited to highly proficient pilots, no correlations could appear between dynamic visual acuity and performance measurements. M.M.

A65-26421 #
PRELIMINARY REPORT CONCERNING PERIPHERAL DYNAMIC VISION.
J. Hoogerheide.
Aeromedica Acta, vol. 9, 1963-1964, p. 139-145. 13 refs.

Experimental investigation of peripheral dynamic vision. A figure shows static visual acuity expressed in minutes of arc as a function of the nasal-retinal position of the test-object image, expressed in degrees of periphery. It is noted that, although the viewing time was varied from 0.1 to 1.0 sec, the experimental results did not show any evidence that lengthening the viewing time improved the static peripheral visual acuity. For purposes of comparison, Wertheim's (x) measurements (1894), with which the present measurements show fair agreement, are also given. M.M.

A65-26437 =
EXAMPLES OF DEFENSE AGAINST LOW OXYGEN AND HIGH CARBON-DIOXIDE TENSIONS IN THE ANIMAL KINGDOM.
Heinz Bartels (Tübingen, Universität, Physiologisches Institut, Tübingen, West Germany).
International Symposium on Basic Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 21. 10 p.
Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Discussion of gas-transport problems encountered during fetal life, by diving mammals and by mammals having vastly differing metabolic rates. Several parallels are drawn between the respiration and gas-exchange problems encountered in these instances due to the low oxygen and high carbon dioxide partial pressures which characterize them and the problems encountered during manned space flight. Evidence is presented to demonstrate that fetal life bears a closer resemblance to life in a spacecraft than does life at high altitudes. It is concluded that man, unlike some lower forms of animal life, will have to rely mainly on technical assistance to survive in the spacecraft environment. S.H.B.

A65-26447
BIOENGINEERING - A NEW DISCIPLINE.
Wen H. Ko and Lloyd E. Slater (Case Institute of Technology, Cleveland, Ohio).
Electronics, vol. 38, June 14, 1965, p. 111-118. 5 refs.

Discussion of microelectronics techniques used in biomedical studies. Which kinds of electronic devices are needed in the life sciences is illustrated by reviewing some recent accomplishments in bioelectronics. These include implanted pacemakers in the human heart, implanted sensors in animals, the use of ultrasonic waves to telemeter command information to bioelectronic devices, and the use of IR waves to monitor the activity of houseflies. Considerations for the design of bioelectronic equipment are reviewed, and the need for stable, miniaturized, long-life power supplies is discussed. Consideration is also given to neuron-sized devices. Possible long-term implications of the use of miniaturized equipment in human and animal biology are noted. P.K.

A65-26527
CIRCADIAN RHYTHMS IN MAN.
Jürgen Aschoff (Max-Planck-Institut für Verhaltensphysiologie, Erling-Andechs, West Germany).
Science, vol. 148, June 11, 1965, p. 1427-1432. 22 refs.
Grant No. NsG 259-62.

Review of experiments on the circadian rhythms of various physiological functions in man. Tests were performed on human subjects isolated from such external time cues as natural daylight, and measurements were made of body temperature, sleeping and waking periods, ability to estimate the passage of time, and times of urine excretion. The maxima in these functions are found to occur with approximately equal periods, though they are not always "in phase." These periods are generally greater than 24 hr. The effects of light intensity on these rhythms are also examined. P.K.

A65-26531 #
CARDIOPULMONARY EFFECTS OF ACCELERATION IN RELATION TO SPACE FLIGHT.
E. G. Wood (Minnesota, University, Mayo Graduate School of Medicine, Rochester, Minn.), W. J. Rutishauser, N. Banchero, A. C. Nolan, A. G. Tsakiris, and D. E. Donald (Mayo Clinic, Rochester, Minn.).
International Symposium on Basic Environmental Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 23. 20 p. 12 refs.
Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Investigation of the effects of transverse acceleration on intrathoracic pressure relationships for dogs in the supine, prone, left decubitus, and right decubitus positions. It is felt that, since the average dorsal-ventral thoracic dimension of 20 cm for the dogs studied is similar to that of human subjects, the hydrostatic effects of acceleration on intrathoracic pressures should also be similar when the dogs are in the supine position. Pleural pressures are recorded simultaneously from ventral, dorsal, and

lateral regions of the thorax using fluid-filled catheters which are radio-opaque. Pressures are also recorded from the potential pericardial space, the right and left atria, the pulmonary artery, aorta, the oral end of an endotracheal tube, and the esophagus. Runs of 55 sec at accelerations ranging from 2 to 7 g are made with the dogs supported in molded plastic casts. The results indicate that the cardiopulmonary effects of acceleration have a significant probability of causing a mission-limiting or mission-failure threat to the functional integrity or welfare of astronauts.
S.H.B.

A65-26600
CONCERNING CERTAIN METHODOLOGICAL AND TECHNICAL PROBLEMS POSED BY ROCKET EXPERIMENTS INVOLVING ANIMALS [DE QUELQUES PROBLEMES METHODOLOGIQUES ET TECHNIQUES POSES PAR LES EXPERIENCES ANIMALES EN FUSEE].
J. Ginet and G. Chatelier (Centre d'Enseignement et de Recherches de Médecine Aéronautique; Ecole Pratique des Hautes Etudes, Laboratoire de Biologie Aérospatiale, Paris, France).
Revue Française d'Astronautique, Mar.-Apr. 1965, p. 44-53.
In French.

Discussion of certain problems arising in connection with the testing of the central nervous system of unanesthetized animals (rats and cats) on board rockets. These tests are said to be distinguished by the fact that they involved studies of the electrical activity of the subjects and, in the case of the cat, a study of the evoked somesthetic potential. The problems discussed concern: (1) the emplacement of the sensors at the level of the central nervous system of the subject and the emplacement of the electrodes for recording the electrocardiogram and the respiration rate; (2) the training of the animals to adapt them to restricted movement, darkness, and noise; and (3) the radio transmission of the physiological parameters. A description is given of the animal-to-amplifier link, the transistorized biological amplifiers, the modulators, and the transmission and recording of the evoked potential.
A.B.K.

A65-26728 =
ON THE DANGERS OF OVER-AROUSAL.
D. E. Broadbent (Medical Research Council, Applied Psychology Research Unit, Cambridge, England).
International Symposium on Basic Environmental Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 1. 16 p. 33 refs.
Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Discussion of the limitations of increased stimulation in a sensory-impoverished environment. In overcoming a decline in working efficiency due to a condition of sensory impoverishment, added stimulation is beneficial only up to a certain point. It is found that the state of arousal depends on the particular combination of noise, incentives, and sleeplessness that a subject experiences for a given task. This state of arousal is felt to have an optimum level which, when exceeded, results in a decline in working efficiency. A possible mechanism for this phenomenon, primarily intended for changes in the level of motivation, is due to Spence. Its failure in explaining certain experiments is cited.
S.H.B.

A65-26739 =
THE UTILITY OF AUTOMATED SYSTEMS IN THE SEARCH FOR EXTRATERRESTRIAL LIFE.
Orr E. Reynolds (NASA, Washington, D.C.) and Harold P. Klein (NASA, Ames Research Center, Moffett Field, Calif.).
International Symposium on Basic Environmental Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 5. 27 p. 19 refs.
Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Discussion of the theories and techniques which underly proposed searches for extraterrestrial life by unmanned spacecraft, particularly on Mars. Since it is felt to be unwise to assume that these life forms would necessarily be chemically identical to terrestrial organisms, tests for their presence should include procedures and devices that are not limited only to the search for familiar materials or processes. An unmanned lander should also be prepared to carry out many tests on the physical and chemical characteristics of the specific environment being sampled. The usefulness of such a lander could be increased by including suitable computer equipment which would have the ability to make decisions based on the results of one set of tests before proceeding to others.
S.H.B.

A65-26740 =
HABITABILITY - GENERAL PRINCIPLES AND APPLICATIONS TO SPACE VEHICLES.
Joseph F. Kubis (Fordham University, Graduate School, New York, N.Y.).
International Symposium on Basic Environmental Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 10. 49 p. 59 refs.
Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Discussion of the problems of habitability which may be expected during prolonged space missions. Habitability involves four basic factors - the physical, physiological, psychological, and social. Problems of habitability develop from habitat-tenant interactions. The resolution of such problems, which depends on a proper adjustment of either or both sides of the habitat-tenant relation, is subject to well defined constraints of technological capability and human tolerance. Habitability requirements vary, depending primarily on the goals and purposes of the space flight. The length of mission, type of vehicle, and size of crew generate habitability problems that are relatively unique to the differing demands associated with these variables. The primary objective of habitability research is to maintain and develop the natural homeostatic mechanisms that are operative at the physiological, psychological, and group levels.
S.H.B.

A65-26743 =
PHYSIOLOGICAL, BEHAVIORAL, AND SUBJECTIVE REACTIONS TO STRESS.
Marianne Frankenhaeuser (Stockholm, University, Psychological Laboratories, Physiological Psychology Unit, Stockholm, Sweden).
International Symposium on Basic Environmental Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 3. 17 p. 9 refs.
Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Discussion of experimental methods for the study of the different reactions induced in an organism by stimuli affecting the level of activation. The influence of intensity and duration of a stressor is illustrated by data from an experiment on unpleasantness and subjective duration as functions of intensity and duration of electrical stimulation. Data from experiments on habituation to gravitational stress and perceptual conflict demonstrate a quantitative relation between the intensity of the subjective reactions and the adrenaline excretion, as well as the tissue conductance. Experiments illustrating the relations between actual and estimated performance, as influenced by variations in activation level, and those illustrating interactions between different stimuli are discussed.
S.H.B.

A65-26744 =
FLUID METABOLISM AND CIRCULATION DURING AND AFTER SIMULATED WEIGHTLESSNESS.
O. H. Gauer, P. Eckert, D. Kaiser, and H.-J. Linkenbach (Berlin, Freie Universität, Physiologisches Institut, Berlin, West Germany).
International Symposium on Basic Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 11. 18 p. 15 refs.
Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Discussion of water-immersion experiments designed to simulate the condition of weightlessness. For immersion periods

of 8 hr, the following results were obtained: (1) osmotic clearance is frequently increased in addition to the usual increase in free-water clearance; (2) by a single injection or a slow infusion of vasopressin the diuresis of water immersion can be interrupted or prevented in the same manner as a water diuresis of the same strength which has been induced by drinking water; (3) an average reduction in plasma volume of 16% is demonstrated by measurements with Evans Blue; and (4) infusion of vasopressin during water immersion in dosages that were too small to affect blood pressure prevented orthostatic collapse in 4 out of 5 subjects. It is considered that, for the interpretation of these results, it is helpful to take the upright rather than the supine position as the normal control state of man. S.H.B.

A65-26745 #

THE TOXIC EFFECTS OF BREATHING OXYGEN.

J. Ernsting (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

International Symposium on Basic Environmental Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 8. 23 p. 87 refs.

Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Review of studies on the toxic effects in the respiratory tract and nervous system caused by breathing an oxygen-enriched atmosphere. The atmospheres to which both man and other mammals were subjected had oxygen partial pressures of as high as 1 atm or had reduced inert-gas concentrations. For men, breathing oxygen at a partial pressure of 1 atm gives rise to retrosternal discomfort the intensity of which increases as the duration of the exposure is extended beyond 12 to 14 hr. No marked impairment of respiratory function has yet been demonstrated in men exposed to partial pressures of oxygen on the order of 0.8 to 1.0 atm for exposure durations of less than 2 days. Reduction of the inert-gas concentration results in a large increase in the rate at which gas is absorbed from any unventilated cavity within the body. The effects of these types of atmospheres on vision and the blood are also reviewed. The need for more research on the pulmonary function during prolonged exposures to oxygen-enriched atmospheres is cited. S.H.B.

A65-26746 #

BIOECOLOGICAL AND BIOMEDICAL MONITORING FOR ADVANCED MAN IN SPACE PROJECTS.

Carl-Johan Clemedson (Defence Medical Board, Stockholm, Sweden).

International Symposium on Basic Environmental Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 22. 32 p. 109 refs.

Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Review of problems encountered in the design of health surveillance systems for astronauts in space. The choice of which parameters to monitor as determined by fundamental considerations, rather than the more practical problems of methods and instrumentation, is emphasized. The parameters to be monitored are divided into two groups - the bioecological, which comprises external and internal environmental factors pertaining to the space vehicle and space suit and the biomedical, comprising physiological and mental factors. Space ambient ionizing radiations, such cabin atmospheric factors as temperature and humidity, oxygen, carbon dioxide, and trace contaminants, and noise and vibration are the bioecological parameters considered. The physiological and physical factors discussed are mainly the functions of cardiovascular and respiratory problems, central nervous systems characteristics, awakeness and alertness, body temperature, and biochemical and immunobiological problems. S.H.B.

A65-26747 #

VASCULAR REACTIVITY TO NEUROHORMONES IN SUBGRAVITY SIMULATED BY IMMERSION METHOD.

J. Walawski and Z. Kaleta (Medical Academy, Dept. of Pathophysiology, Warsaw, Poland).

International Symposium on Basic Environmental Problems of Man in Space, 2nd, Paris, France, June 14-18, 1965, Preprint no. 4. 9 p.

Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Investigation of the effects of neurohormones on the vascular reactions of dogs during prolonged weightlessness simulated by immersion in salt water. The 10 male dogs used were treated by chloralose narcosis before being placed in a 3% NaCl solution the temperature of which was between 34 and 35°C. Adrenaline, noradrenaline, serotonin, histamine, and acetylcholine were injected before and during the immersion period which ranged from 12 to 24 hr. Respiration was effected by a trachia tube, and blood pressure in the carotid artery was measured with a mercury manometer. The results of these experiments indicated that a 24-hr exposure to this simulated weightless environment does not produce significant changes in the vascular reactions to neurohormones. There are moreover, no significant changes in the functioning of the blood vessels due to this exposure. S.H.B.

A65-26773 #

FUNCTIONAL DISTURBANCES OF VESTIBULAR ORIGIN OF SIGNIFICANCE IN SPACE FLIGHT.

A. Graybiel (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).

International Symposium on Basic Environmental Problems of Man in Space, 2nd, Paris, France, June, 14-18, 1965, Preprint no. 24. 52 p. 42 refs.

Symposium sponsored by the International Astronautical Federation, International Academy of Astronautics, UNESCO, International Atomic Energy Agency, International Telecommunication Union, World Health Organization, and World Meteorological Organization.

Investigation of the behavior of eleven subjects with labyrinthine defects (L-D subjects) when subjected to visual illusions. Data were organized relative to their bodily orientation and locomotion and their susceptibility to motion sickness. Autokinetic tests revealed that for the L-D group the amount of observed movement averaged more than twice that of a control group composed of nine normal subjects. Results based on "oculogyric" and "oculogravic" tests indicate that nonotolith graviceptor inputs contribute to the perception of the "oculogravic" illusion but that this contribution is variable and quantitatively inadequate. Body orientation was tested using a mechanically driven tilt chair under the optional control of the subject and the experimenter - the performance of normal subjects was slightly superior to that of the L-D group, but the differences were not statistically significant. Other body orientation tests are described. Normal and L-D subjects were exposed to identical or nearly identical conditions in the slow rotating room, the counter-rotating room, in the air, and at sea. The normal subjects became motion sick but the L-D subjects did not. D.P.F.

A65-26896 =

PROTECTOR EFFECTS IN SUBLETHAL-DOSE IRRADIATION [DEISTVIE PROTEKTOROV PRI OBLUCHENII V SUBLETAL'NYKH DOZAKH].

S. P. Iarmonenko, A. G. Konopliannikov, N. N. Suvorov, and V. M. Fedoseev (Akademiia Meditsinskikh Nauk SSSR, Institut Gigieny Truda i Profzabolevanii; Moskovskii Gosudarstvennyi Universitet; Vsesoiuznyi Khimiko-Farmatsevticheskii Institut, Moscow, USSR).

Akademiia Nauk SSSR, Doklady, vol. 162, May 1, 1965, p. 205-207. 12 refs. In Russian.

Experimental evidence of the effectiveness of s, β-aminoethyl-isothiuronium-dihydrobromide (AET) and 5-methoxytryptamine hydrochloride (5-MOT) as protectors at low irradiation levels, based on marrow cell dynamics rather than mortality observations. Experiments are described in which 1900 male mice weighing 20 to 24 gm were given intra-abdominal doses of 7 and 1.8 mg of the protectors, respectively, and irradiated with 270, 400, and 700 rad. Greater numbers of marrow cells were noted in protected mice than in unprotected ones. The mechanism of the protective effect at 300- to 950-rad irradiation levels is discussed. V.Z.

A65-26943

CHEMICAL BASIS OF COLOUR VISION AND COLOUR BLINDNESS.

W. A. H. Rushton (Cambridge, University, Trinity College, Cambridge, England).

Nature, vol. 206, June 12, 1965, p. 1087-1091. 22 refs.

Discussion of some chemical and psychophysical factors underlying the perception of color. The effects of light falling on photosensitive pigments in the eye are reviewed, largely on the basis of experiments on different types of color defectives. Stiles' analysis of the threshold for flashes of monochromatic light when displayed on various monochromatic backgrounds is described, from which he showed broadly that there are four independent mechanisms in the eye - the rod and the blue, green, and red cone mechanisms. Studies of pigments in single cones are briefly discussed. P.K

A65-26978

SPATIAL AND DYNAMIC ASPECTS OF VISUAL FIXATION.

G. M. Jones (Defence Research Board, Aviation Medical Research Unit, Ottawa; McGill University, Dept. of Physiology, Montreal, Canada) and J. H. Milsum (McGill University, Dept. of Electrical Engineering, Montreal, Canada).

IEEE Transactions on Bio-Medical Engineering, vol. BME-12, Apr. 1965, p. 54-62. 36 refs.

Investigation of the physiological processes concerned with the task of fixating the retinal image during normal body and head movement. A systems engineering approach is employed in the discussion, and the study is largely restricted to the neuromuscular outputs to the eye-in-skull and skull-on-body spatial platforms. Spatial relationships between the visual and vestibular inputs and these outputs are examined in the context of the geometry of the environment with the aid of an information flow diagram. From dynamical considerations, a picture emerges in which the visual tracking system has adequate accuracy and dynamic range for following most naturally moving objects when the head is still. S.H.B.

A65-26980

CONSIDERATION FOR ENVIRONMENTAL RESEARCH IN HUMAN FACTORS.

Frederick H. Rohles, Jr. (Kansas State University of Agriculture and Applied Science, Institute for Environmental Research, Manhattan, Kan.).

Journal of Environmental Sciences, vol. 8, June 1965, p. 18-20.

Discussion of the variables which have to be taken into account and preferably controlled in environmental research. These variables are considered in three groups: (1) organismic factors such as sex, age, diet, rhythmicity, and BMR; (2) reciprocal factors such as activity, clothing, exposure, and social conditions; and (3) the physical factors, such as sound, light, area-volume, radiation, inspired air, atmospheric pressure, force field, air movement, and temperature-humidity ratio. The significance of some of these factors is briefly noted. Finally, the concept of the Standard Man is suggested which would define the limits of physiological and psychological functioning under a nonstressful, nonanxious, and neutral environment. It is pointed out that this concept would be of utility in research of stressful environments. A tentative list of the normative data for the Standard Man concept is included. M.L.

A65-26982

LUNAR SURFACE AND FREE SPACE HAZARDS RELATING TO SPACE SUIT DESIGN.

Jerry R. Goodman and Matthew I. Radnofsky (NASA, Manned Spacecraft Center, Crew Systems Div., Houston, Tex.).

(Institute of Environmental Sciences, Annual Meeting, Human Factors Session, Chicago, Ill., Apr. 22, 1965.)
Journal of Environmental Sciences, vol. 8, June 1965, p. 26-31.

Discussion of the anticipated lunar environmental conditions, and of their interaction with human physiology. Factors discussed include the atmospheric pressure, the lunar terrain and its effect on metabolism, simulated lunar surface and gravity tests, and the thermal and meteoroid environments. The Apollo Extravehicular Mobility Unit (EMU) is described. The lunar environmental conditions are summarized, and the resulting EMU design is presented. In addition, some of the testing aids used to simulate the lunar environment are considered. M.L.

A65-27039 *

PILOT RELIABILITY AND SKILL RETENTION FOR SPACE FLIGHT MISSIONS.

Milton A. Grodsky and G. C. Lattman (USAF, Systems Command, Washington, D.C.).

Air University Review, vol. 16, May-June 1965, p. 22-32.

Discussion of recent experimental determinations of the reliability of pilots in an integrated mission simulation of a long-duration space-flight mission. Two aspects of pilot reliability were investigated - the reliability of groups of pilots during a 7-day simulated lunar mission (after a period of training and tests to assure that a stable level of performance existed prior to this mission) and (2) the retest of the same groups of pilots, one group tested 30 days after the mission, the other 60 days after, to ascertain skill retention in selected tasks. It is noted that, although the primary concern is with the reliability of task performance after long periods without practice (30 and 60 days), sufficient discussion of the initial reliability study (7-day mission) is presented to provide a proper background. It is pointed out that the data obtained from the skill-retention program are still in the process of being analyzed. However, a preliminary review of the data indicated that the 30-day group showed a minimal loss in skill retention but that the 60-day group did suffer a skill-retention loss in complex tasks. M.M.

A65-27041 *

LIFE SUPPORT IN SPACE OPERATIONS.

John M. Talbot (USAF, Office of the Surgeon General, Washington, D.C.).

Air University Review, vol. 16, May-June 1965, p. 42-52. 7 refs.

Review of current operational life-support systems and of some developmental approaches to life support for manned space flight. It is noted that the study was prepared as an introduction to the subject of life support in manned space vehicles. Most of the important aspects of the subject are treated in sufficient depth to give the reader an appreciation of the scope of life support for manned space flight and the current state of the art. The hope is expressed that the critical importance for mission completion of reliable life-support equipment will immediately be recognized as well as the fact that extensive research and development efforts will be necessary to evolve the kinds of high-quality, automatic life-support systems envisioned for future long-term space missions. M.M.

A65-27048

AVIATION MEDICINE IN GERMANY [FLUGMEDIZIN IN DEUTSCHLAND].

Erwin A. Lauschner (Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany).

Bild der Wissenschaft, vol. 2, June 1965, p. 466-473. In German.

Review of the state of aviation medicine in Germany. The history of this branch of medicine in Germany is outlined, emphasizing the leading position that Germany once occupied in this field. The present state of aviation medicine in Germany is seen to be one of backwardness, in comparison with the US and the USSR, aviation medicine not even being considered as a separate discipline at West German universities. It is thought that, although the Federal Republic cannot hope to compete in the near future with countries that have already taken the lead in manned space flight, there are many valuable contributions that it can make in a number of areas of basic research. A.B.K.

A65-27064

CORTICAL-SUBCORTICAL RELATIONSHIPS OF THE CHIMPANZEE DURING DIFFERENT PHASES OF SLEEP.

J. M. Rhodes, M. R. Reite, Dan Brown, and W. R. Adey (California, University, Medical Center, Brain Research Institute, Los Angeles, Calif.).

IN: ANATOMICOFUNCTIONAL ASPECTS OF THE PHYSIOLOGY OF SLEEP [ASPECTS ANATOMO-FONCTIONNELS DE LA PHYSIOLOGIE DU SOMMEIL]. COLLOQUES INTERNATIONAUX DU CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, LYON FRANCE, SEPTEMBER 9-11, 1963.
Paris, Editions du Centre National de la Recherche Scientifique, 1965, p. 451-472; Discussion, p. 472, 473. 5 refs.
Grants No. NsG 502; No. NsG 203-62; No. AF AFOSR 246-63.

Investigation of cortical and subcortical electroencephalographic recordings in the chimpanzee in differing sleep stages. Stereotaxic procedures were used for the implantation of electrodes; a total of 18 to 27 leads was available in each of the four animals, with 10 to 16 of these in subcortical structures. All recordings were bipolar, and they were generally occipital-parietal. Basic sleep patterns are categorized as: (1) sleep-awake, (2) spindling, (3) slow wave, and (4) paradoxical. The last is defined as that state of sleep characterized by eye

movements, and relatively low-voltage fast activity. The effect of "click" stimuli on the electroencephalograms is graphically illustrated. Stability-measuring techniques were developed where stability in time is equivalent to the effective duration of a wave train and frequency stability is the effective spread in frequency, or the bandwidth. The cross-plot of bandwidth vs duration is the stability diagram. A method is described for a frequency analysis program whereby the spectrum is first computed by performing an autocorrelation function and then the Fourier transform is taken as an estimate of the spectrum. A 36-bit computer with a memory storage for 32,000 words was used in processing the data obtained from the tests. D. P. F.

A65-27097

EXPERIMENTS ON THE ORIGIN OF CELLS.

Michael H. Briggs (Analytical Laboratories, Ltd., Hartham, Wilts., England).

Spaceflight, vol. 7, July 1965, p. 129-131. 23 refs.

Experimental work relative to the formation of complex organic compounds from the action of UV light on sterilized solutions containing citric acid or other simple compounds and a colloidal salt of molybdenum or iron. A series of solutions was made up in 150-ml conical flasks. Each solution was represented by 14 such flasks, and each flask was plugged with cotton wool and then sterilized by autoclave. The plugs were protected with polyethylene sheet. Two flasks of each solution were kept in the dark while the other 12 were exposed to the light of a 500-watt bulb continuously for a period of four months. The flasks were then opened and samples examined microscopically. Samples innoculated in sterile growth media for a period of two weeks did not exhibit any growth, thereby indicating the absence of microbial contamination of the flasks. Microscopic examination of samples from the flasks stored in darkness failed to reveal any microstructures, but all those exposed to light revealed globular structures ranging in size from about 0.5 to 15 μ. Most structures were solitary, but some showed budding. Larger centrifuged samples of the light-exposed solutions separated into a precipitate and a clear supernatant, both of which were subjected to amino-acid analysis by high-voltage electrophoresis. Chromatographic methods were used to detect purines, pyrimidines, aromatic compounds, reducing sugars, and urea. The results indicate the presence of amino acids with a morphology similar to that of simple cells. It seems probable that objects similar to those observed were formed in the oceans of the primitive Earth and were the precursors of cellular life. D. P. F.

A65-27098

POSSIBLE ALTERNATIVE CHEMISTRIES OF LIFE.

V. A. Firsoff.

Spaceflight, vol. 7, July 1965, p. 132-136. 11 refs.

Discussion of chemical elements and compounds suitable for prolonged biomolecular evolution and chemical selection in light of varying planetary conditions of environment and temperature. The most salient chemical features of life are discussed as algebraic terms without the substitution of any definite chemical species for symbols. An important feature of the molecular structures occurring in biology is that of a state of labile equilibrium, under which they respond to stimuli in chemical terms but revert to original constitution once the disturbance is over. A solvent is necessary for chemical interchange and exchange; this and other considerations restrict any given life system to a fairly narrow temperature range. It is shown that the elements which exhibit the phenomena of catenated hydride formation and ready polymerization are those which are included in the Groups III to V of the periodic table. Reasons are given which show that boron is not suitable as an independent catenant, but that the elements in Group IV, including C, Si, and Ge are. Hydrosilicons or silanes and germanes are described. Nitrogen is discussed as a suitable catenant, with particular reference to the B-N series of compounds which form polymers analogous to some of the hydrocarbons such as borazole, the analog of benzene. Various possible solvents are investigated in terms of their suitability for such catenant systems at differing environmental temperatures. NH_3, HF, F_2O and $HgBr_3$ are all possibilities, depending on the planetary temperatures. Catenant systems based on atoms of the noble gases which are polarized in the presence of strong dipole solvents, such as F_2O, are discussed as being applicable to very cold planets such as Pluto. D. P. F.

LC ENTRIES

A65-81300
NUTRITIONAL CONSTITUENTS AS NATURAL PROTECTIVE AGENTS AGAINST X-RADIATION INDUCED CHROMOSOME DAMAGE [NAHRUNGSBESTANDTEILE ALS NATURLICHE SCHUTZSTOFFE GEGEN RONTGENINDUZIERTE CHROMOSOMENSCHADEN].
A. Barthelmess, H. Fürst, and H. Huber (Munich U., Botan. Inst., West Germany).
Naturwissenschaften, vol. 52, Apr. 1965, p. 160–161. In German.

Radioprotective capacity of naturally occurring redox catalysts and aminoacids was explored. Allium cepa rootlets, 2 to 4 cm long were treated for two hours with watery solutions of aspartic acid, glutamic acid, gallic acid, nicotinamide, pyridoxine, ascorbic acid, riboflavin, vitamin A, vitamin E, and Tween 40 (sorbitan polyoxyalkalene derivative). The rootlets then were irradiated with 100 r at 200 kV, 15 mA, Cu-filter 1,0 mm distance 40 cm. Cytological investigation of mitoses showed a statistically significant protective effect for all substances used with the exception of riboflavin.

A65-81301
FIRST COSMIC GROUP FLIGHT [PERVYI GRUPPOVOI KOSMICHESKII POLET].
Edited by N. M. Sisakian and V. I. Iazdovskii
Moscow, Nauka, 1964, 153 p.

The authors discuss medico-biological studies conducted on astronauts before, during, and after the first cosmic group flight. During training the following studies were conducted: (1) effect of weightlessness in parabolic plane flights; (2) effect of acceleration stress on the centrifuge; (3) effect of high temperatures in the thermal chamber; and (4) studies of physiological and psychological data in isolation chambers and in mock-ups. The following aspects were investigated in flight: (1) piloting and maneuvering of the spacecraft; (2) performing physical and mental tasks; (3) effects of atmosphere; (4) food and water intake; (5) elimination; (6) effects of cosmic radiation on the human organism and on biological specimens carried on board. Methods of telemetry are described for the study of physiological and psychological state of astronauts, and medical control from the ground. Comparative examinations of processed physiological data are presented, indicative of the astronauts' reactions before lift-off, during orbital flight, and upon reentry. The results of a complete physical and psychological examination are tabulated on the data immediately after landing and during the post-flight period.

A65-81302
RESPONSES OF SINGLE UNITS IN LATERAL GENICULATE NUCLEUS OF CAT TO MOVING VISUAL PATTERNS.
W. Kozak, R. W. Rodieck, and P. O. Bishop (Sydney U., Dept. of Physiol., Brain Res. Unit, Australia).
Journal of Neurophysiology, vol. 28, Jan. 1965, p. 19–47. 34 refs.
Natl. Health and Med. Res. Council; Ophthalmic Res. Inst.; and Sydney U., Postgraduate Med. Found., Australia supported research.

The averaged responses of single lateral geniculaet nucleus (LGN) units in cats to moving cardboard figures under servomechanical control have been investigated. On-center units were found to fire transiently either to the movement of a white figure into their receptive fields or to the removal of a black figure. Conversely, off-center units were found to fire transiently either to the movement of a black figure into or to a white figure out of their receptive fields. A black figure moved before a white background into the receptive field of an on-center unit was found to produce the same form of response pattern as a white figure before a black background moved into the receptive field of an off-center unit, and vice versa. Small, black figures were found to suppress the firing of an on-center unit if moved into the center of the receptive field; whereas larger figures caused the unit to fire only transiently as the figure entered or left the receptive field. The equivalent statement also applies to a white figure moved into an off-center receptive field. The response patterns of LGN units were found to vary in a characteristic manner as the size, shape, and speed of the figures were varied. Radial movement of a small figure through the receptive field of a unit was found to produce the same form of response as chordal movement. Units produced stronger responses to small moving spots than to changing ambient illumination. The level of ambient (or background) illumination was not a significant factor in the response patterns.

A65-81303
INHIBITION OF NONSPECIFIC SENSORY ACTIVITIES FOLLOWING STRIOPALLIDAL AND CAPSULAR STIMULATION.
G. Krauthamer and Denise Albe-Fessard (Paris U., Fac. des Sci., Lab. de Physiol. des Centres Nerveux, France).
Journal of Neurophysiology, vol. 28, Jan. 1965, p. 100–124. 94 refs.
Grants NIH NB 04795-01; AFOSR AF-EOAR-63-13.

In cats under chloralose anesthesia, the nonspecific peripherally evoked responses of the anterior marginal and middle suprasylvian gyrus were inhibited following stimulation of the basal ganglia. The inhibition was bilateral and limited to the nonspecific sensory potentials evoked by peripheral stimuli. Primary somatic, visual, and auditory potentials were not inhibited. The inhibition was not associated with any cortical activity of striatal origin and the results of cortical ablation experiments indicate a subcortical locus of inhibition. The parameters of the inhibitory stimulation were studied. Mapping of the basal ganglia showed the inhibitory points to be concentrated in the dorsolateral aspect of the head of the caudate nucleus, the dorsal globus pallidus, and the entopeduncular nucleus. Other inhibitory zones were located in the internal capsule. The possible significance of this distribution of inhibitory zones is discussed. The inhibition extended over 150–350 msec. Its onset was gradual, building up to a maximum 30–50 msec. after striatal stimulation. Intravenous strychnine in subconvulsive doses blocked the inhibition, thus suggesting a postsynaptic type of inhibition. The results were examined in relation to other results reported in the literature, possible current spread, and anatomical pathways.

A65-81304
INVESTIGATION OF UNCONDITIONED VASCULAR RESPONSES TO THERMAL STIMULATION OF RESTRICTED SKIN AREAS [ISSLEDOVANIE SOSUDISTYKH BEZUSLOVNYKH REFLEKSOV NA TEMPERATURNYE RAZDRAZHENIIA OGRANICHENNYKH UCHASTKOV KORI].
V. V. Orlov (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Lab. of Circulatory Physiol., Leningrad).
Fiziologicheskii Zhurnal SSSR, vol. 51, Apr. 1965, p. 479–486. 7 refs.
In Russian.

A study of unconditioned vascular reflexes to thermal stimulation of small skin areas was conducted on a group of adults under normal laboratory conditions, at a room temperature of 18° to 20° C. When heat was applied to a 30 cm^2 area of the skin of the shoulder or upper arm with warm water (43° to 47° C) the plethysmogram showed no peripheral vascular dilation. However, subjecting the skin to low temperatures, produced a reflex of vascular constriction in the fingers. The degree of constriction depended on the temperature and on the skin area stimulated, but was independent of the duration of the stimulus or of the area's location. It was noted that, because of the pronounced effects of the unconditioned vascular skin chilling reflexes, the study of the higher nervous activity in man is impaired.

A65-81305
PILOT RELIABILITY AND SKILL RETENTION FOR SPACE FLIGHT MISSIONS.
Milton A. Grodsky and C. C. Lutman (Headquarters AF Systems Command, Washington, D. C.)
Air University Review, vol. 16, May–Jun. 1965, p. 22–32.

A pilot's usefulness during space missions is determined not by the estimated lack of his ability to perform an assigned task after appropriate training but by an estimate of his reactivity to physiological and psychological stresses imposed upon him during flight. Recent studies have been concerned with experimentally determining the reliability of pilots in an integrated simulated long-duration space flight mission. Two aspects were investigated: the reliability of pilots immediately after a period of training and after long periods without practice. Simulated lunar mission tasks may be divided into the following categories: (1) flight maneuvering; (2) operating and adjusting control switches; (3) information handling; (4) procedural tasks; and (5) navigation. A preliminary review of the data obtained indicates that after 30 days of inactivity there appeared to be a minimal loss of pilot skill retention in all task categories. The errors could be considered noncritical to flight. After 60 days of inactivity, ability retention was severely impaired. In both cases a rapid increase of proficiency after repeated testing was observed.

A65-81306
LIFE SUPPORT IN SPACE OPERATIONS.
John M. Talbot (USAF, Office of the Surg. Gen., Washington, D.C.)
Air University Review, vol. 16, May–Jun. 1965, p. 42–52. 7 refs.

Space flight life support system research and development can be divided into two main categories: environmental control and biologistics. The natural space environment presents a great variety of problems such as: hard vacuum; visible, thermal, ultraviolet, and ionizing radiation; temperature extremes; and isolation. In an artificial environment the following aspects require consideration; gaseous systems; temperature control; radiation shields; acceleration stress during launch and re-entry maneuvers; artificial gravity; vibration and noise; and waste management. Biologistics includes the study of: (1) metabolic needs, such as nutrition, water, oxygen and work-rest-sleep balance; (2) personal hygiene; (3) psychological problems of isolation; and (4) aspects of preventive medicine and medical aid. At present the systems are all-expendable, nonregenerative, but the Manned Orbiting Laboratory Program will require certain regenerative features, such as oxygen and water reclamation.

A65-81307
THE SPACE ENVIRONMENT.
Benjamin G. Holzman (AF Cambridge Res. Labs., Bedford, Mass.)
Air University Review, vol. 16, May-Jun. 1965, p. 54-67.

Studies of space-environmental phenomena of importance to space flight missions apply to the following: (1) solar emanation and magnetic fields associated with it; (2) cosmic radiation; (3) radio noise sources from deep space; (4) meteorite showers and meteorite belts permanently surrounding the earth; (5) Van Allen belt radiation; (6) free hydrogen in our galaxy; (7) lunar environment and surface layer structure; and (8) planetary environments. Results of these studies may help in the detection of unsuspected phenomena which may be exploited or produce information of some previously unknown hazards. The studies are carried out by astronomical observation, orbiting satellites, rockets, and balloons. Some aspects can be studied in earth-stationed laboratories by simulation of conditions found or suspected to exist in outer space.

A65-81308
THE INFLUENCE OF SEASONAL VARIATION, DIET AND PHYSICAL ACTIVITY ON SERUM LIPIDS IN YOUNG MEN IN ANTARCTICA.
A. Antonis, M. C. Path, I. Bersohn, F. C. Path, R. Plotkin, O. L. Easty, and H. E. Lewis (South African Inst. for Med. Res., Ernest Oppenheimer Heart Res. Unit, Johannesburg; and Natl. Inst. for Med. Res., Div. of Human Physiol., London, Great Britain).
American Journal of Clinical Nutrition, vol. 16, May 1965, p. 428-435. 14 refs.
British and South African Antarctic Surv. sponsored research.

The long-term effects of diet, physical activity, and seasonal variations on serum lipids have been studied over a period of one year in Antarctica. Seasonal changes in serum total cholesterol, phospholipid, and triglyceride levels were minimal. Physical activity and dietary intake showed considerable variations. The changes in the alpha- and beta-lipoprotein cholesterol concentration were significant. In winter beta-lipoprotein cholesterol levels rose significantly while alpha-lipoprotein cholesterol levels fell. Increased physical activity resulted in decreased beta-lipoprotein cholesterol concentration with a corresponding increase in alpha-lipoprotein cholesterol. Normalization occurred within a month. Studies with subjects spending their second year in the polar regions showed attenuation of all lipid parameters investigated.

A65-81309
MEDICAL FACTS FOR PILOTS.
Stanley R. Mohler and Peter V. Siegel (FAA, Office of Aviation Med., Oklahoma City, Okla.)
Canadian Air Line Pilot, vol. 21, Apr. 1965, p. 37-40.

Although air pilots are required to undergo a general health examination at regular periods, there are some important factors with which every pilot should be familiar. Fatigue generally slows reaction times and causes foolish errors due to inattention. Keeping active during long flights minimizes the fatigue effects. It is impossible to predict when or where hypoxia may occur during a given flight; however, certain signs can be noted at the onset of hypoxia, such as slowing of reactions, impaired thinking ability, unusual fatigue and a dull headache. At no time should a pilot assume flying duty while under the influence of alcohol. Self-medication or taking medicine in any form while piloting can be extremely hazardous. The acceleration encountered during flying could produce vertigo, which can be overcome primarily by closing eyes for a short time or watching the instrument panels. Carbon monoxide poisoning may occur due to faults of heating devices and should be anticipated.

A65-81310
PRESSURE DISTRIBUTION ON THE SURFACE OF THE HUMAN BODY. I. EVALUATION IN LYING AND SITTING POSITIONS USING A "BED OF SPRINGS AND NAILS".
Olgierd Lindan, Robert M. Greenway, and Janet M. Piazza (Western Reserve U. Med. School, Highland View Hosp., Cleveland, Ohio).
Archives of Physical Medicine and Rehabilitation, vol. 46, May 1965, p. 378-385. 7 refs.
Grant VRA RD-695.

A device using the principle of spring compression was constructed allowing measurement of contact pressure at up to 1000 points under a reclining subject. Comparison of pressure distribution was made in normal persons in lying and sitting positions. The effect of abnormal body weight was investigated.

A65-81311
TELUS: TELEMETRIC UNIVERSAL SENSOR FOR SPACE AND TERRESTRIAL APPLICATIONS.
W. G. Glenn and W. E. Prather (USAF School of Aerospace Med., Brooks AFB, Tex.)
IN: PROC. OF THE 1965 NATL. TELEMETERING CONF., HOUSTON, TEX., APR. 1965.
New York, Lewis Winner, Apr. 1965, p. 65-67. 6 refs.

A65-81312
PHYSIOLOGICAL MONITOR: EXPERIENCE, CLINICAL VALUE AND PROBLEMS.
C. Vallbona, I. A. Geddes, G. M. Harrison, H. E. Hoff, and W. A. Spencer (Baylor U. Coll. of Med., Houston, Tex.)
IN: PROC. OF THE 1965 NATL. TELEMETERING CONF., HOUSTON, TEX., APR. 1965.
New York, Lewis Winner, Apr. 1965, p. 126-129. 10 refs.
Grants PHS FR00129; PHS HM00365; VRA Res. and Training Center (RT-4).

Physiological monitoring has been carried out for the last four years at the Texas Institute for Rehabilitation and Research. The monitor used is a bedside device which permits recording of temperature, electrocardiogram, impedance pneumogram, and arterial blood pressure by electrosphygmography. Analog data on these functions are transmitted by hardware telemetry from the bedside to the Center for Vital Studies of the Institute and the Physiology Laboratory of Baylor University College of Medicine. Meter readings of digital values of temperature, instantaneous heart rate, respiratory rate, and blood pressure are considered the most useful forms of display on the monitor. Experience acquired with the system has made it possible to establish some of the engineering, clinical, and analytic requirements of appropriate usage of bedside monitors.

A65-81313
INFLUENCE OF THE LABYRINTH ON UNITARY DISCHARGE OF THE OCULOMOTOR NUCLEUS AND SOME ADJACENT FORMATIONS.
Ermanno Manni, Giovan Battista Azzena, Hugh Casey, and Robert S. Dow (Good Samaritan Hosp., Lab. of Neurophysiol., Portland, Ore., and Sassari U., Inst. of Human Physiol., Sardinia, Italy).
Experimental Neurology, vol. 12, May 1965, p. 9-24. 33 refs.
Grant NIH NB-03707.

The unitary discharge of the oculomotor nucleus and other adjacent mesencephalic formations was recorded in guinea pigs following caloric stimulation of the labyrinth. The oculomotor units usually responded to the vestibular stimulation with rhythmical discharges. The outbursts were separated by periods of total inhibition of the electrical activity. The rhythmical discharges were designated as "quick" or "slow" responses, depending on the duration of each single outburst. Less frequently, labyrinthine stimulation elicited a long-lasting increase in the discharge rate of the oculomotor units (up to 50/sec) with recruitment of new units, which was designated a "continuous activation." About two-thirds of the units located in the gray substance ventral to the aqueduct, in the reticular formation and in the red nuclei responded to vestibular stimulation with a continuous activation. One-third of the recorded units showed the rhythmical responses, which were also obtained from the medial longitudinal fasciculus. Simultaneous recording of the mesencephalic unitary discharge and the electrical activity of a few fibers of the ipsilateral oculomotor nerve permitted the investigation of the relationship of the nuclear responses to the phases of the eye nystagmus and ocular deviations.

A65-81314
PROCEEDINGS OF THE 1965 NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 1965.
New York, Lewis Winner, Apr. 1965, 288 p. Refs.
Instrument Soc. of Am; Am. Inst. of Aeron. and Astronautics; and Inst. of Elec. Engr. supported research.

This book contains articles of various aspects of physiological telemetry. Subject areas included are measurements of physiological data of wild animals, patients, and subjects in space simulation studies. Various aspects of data processings of the telemetric data are discussed. Pertinent articles are abstracted separately.

A65-81315
SPONTANEOUS ELECTRICAL ACTIVITY OF THE BRAIN IN HIBERNATORS AND NONHIBERNATORS DURING HYPOTHERMIA.
L. C. Massopust, Jr., L. R. Wolin, and J. Meder (Cleveland Psychiat. Inst., Lab. of Neurophysiol., Ohio).
Experimental Neurology, vol. 12, May 1965, p. 25-32. 19 refs.

During induced hypothermia, electrical activity recorded from the cerebral cortex of nonhibernators (cat and guinea pig) and hibernators (prairie dog and ground squirrel) gradually fell to the isoelectric point at 25°C esophageal of buccal temperature in the nonhibernators and 17°C in the hibernators. Electrical activity in the mesencephalic reticular formation remained at good amplitudes to about 23o C esophageal and buccal temperature in the cat and guinea pig, and was still present at 16°C in the prairie dog and ground squirrel. Cats and guinea pigs did not rewarm if their esophageal temperatures fell below 24°C. Even at 25°C it was necessary to apply resuscitation technics and direct heart warming to recover the animal. Prairie dogs and ground squirrels rewarmed, after their esophageal temperatures dropped below 16°C, without resuscitation and heart warming. The sustained electrical activity observed in the anterior reticular formation of hibernators below 16°C buccal temperature suggests a special mechanism for the maintenance of minimal metabolic conditions and circulatory integrity at reduced body temperature.

A description is given of the Telemetric Universal Sensor (TELUS) for space and terrestrial application. TELUS was made from commercial components and designed to do the following: (a) receive telemetered signals directly or indirectly from air or ground by radio, telephone, and magnetic tape; (b) initiate or relay data to space or ground; (c) decode frequency modulated signals; (d) code data and retrieve information from magnetic tape; (e) prepare data for viewing on an oscilloscope and a chart recorder; and (f) simultaneously receive 4 channels of information and record it on any of 14 channels on magnetic tape. Sensors can be linked to TELUS for recording heart, brain and respiratory functions. Pure physical and chemical data can also be handled. Detailed operation of the TELUS is explained. TELUS is based on FM/FM telemetry and an advantage is that data can be added by incorporating another subcarrier. Data are received from widely separated instruments, and this makes the subcarrier system the best method of combining data. Success of the TELUS system will depend on already established communication stations. Anticipated paths and field areas to be used are discussed.

A65-81316
THE INFLUENCE OF SPATIAL ORIENTATION ON THE POGGENDORFF ILLUSION.
Robert T. Green and Elaine M. Hoyle (U. Coll., London, Great Britain).
Acta Psychologica, vol. 22, Apr. 1965, p. 348-366. 20 refs.

Earlier accounts of the Poggendorff illusion all fall short in some vital respect. By manipulating the boundary conditions governing the illusion it is possible to arrive at a better understanding of the processes involved. One of these boundary conditions, spatial orientation, proves to be of major importance, not only so far as the Poggendorff illusion is concerned, but as a means of relating the optico-geometric illusions to constancy principles. Previous "misapplied constancy" theories, drawing on depth perception processes, are the original examples of this type of approach. By combining adaptation level theory with a variety of constancy processes it seems probable that all the standard optico-geometric illusions may be derived from a common set of principles. In particular, experimental evidence is adduced to support the idea of a conceptual horizontal-vertical grid, against which judgements of orientation and alignment are made.

A65-81317
PERSONALITY, TIME ESTIMATION AND TIME EXPERIENCE.
J. E. Orme (Middlewood Hosp., Sheffield, Great Britain).
Acta Psychologica, vol. 22, Apr. 1965. p. 430-440. 12 refs.

From studies involving several hundred psychiatric patients and control subjects, certain consistent findings emerged with regard to the verbal estimation of 30 (and 20) minute intervals. Control subjects gave estimates centering on a figure slightly less than 30 minutes. This agreed with the general finding in the literature that "filled" intervals are estimated as slightly less than the clock period. Hysterics, psychopaths and manics gave relatively large estimates; depressed and anxious neurotics, together with melancholics, gave relatively small estimates. Holding psychiatric diagnosis constant, individual variations in estimate were significantly associated with psychomotor speed, certain psychophysiological variables, spiral after-effect duration, and vigilance task error. With a mixed psychiatric group, individual variations in estimate were positively associated with a revised version of Cattell's "dissociation" personality factor. Certain of the studies also included productive and verbal estimates of a 30 seconds interval. A discussion of the findings has been made with an attempt at interpretation.

A65-81318
SOME RELATIONS BETWEEN AUTOKINETIC MOTION AND SPACE LOCALIZATION.
Joseph A. Glick, Seymour Wapner, and Heinz Werner (Clark U., Worcester, Mass.)
Acta Psychologica, vol. 24, May 1965, p. 41-48. 8 refs.
Grant NIH MH-00348.

The relationship between autokinetic motion and apparent object displacement was assessed by comparing the results of two experiments: in each experiment, a horizontal luminous line served as stimulus object, and both ascending and descending gliding tones were employed; in one experiment, autokinetic motion was measured and in the other; spatial displacement in the up-down dimension was measured. Whereas dynamic auditory stimulation leads to apparent motion of the stimulus object relatively in the direction of tonal dynamics, it also leads to an apparent displacement of the stimulus object in a direction relatively opposite tonal dynamics. Further, independent of auditory stimulation conditions, the overall direction of autokinetic motion was upward and the overall direction of apparent displacement of the stimulus object was also upward. The problem posed by these paradoxical findings for an understanding of perceptual processes is discussed.

A65-81319
RELATION OF THE EFFECT OF KNOWLEDGE OF RESULTS TO DISTRIBUTION OF TRIALS.
Vidhu Madan and Mukul K. Dey (Panjab U., Chandigarh, India).
Acta Psychologica, vol. 24, May 1965, p. 68-80. 20 refs.

The hypothesis was advanced that the effect of any variable on performance improvement by knowledge of results (KR) depends upon how it separately influences the informative and motivational functions of KR. It was predicted from this hypothesis that the rate of performance improvement by KR would be higher with massed rather than distributed trials, if KR were administered in a manner which minimizes its informative function. An experiment carried out with a simple time-estimating task furnished inconclusive data. The results did support the hypothesis that the rate of performance improvement is directly proportional to the percentage of trials with KR. However, there was a failure to obtain significant performance decrement following the cessation of KR.

A65-81320
ON THE REPRODUCIBILITY OF STEADY STATE D_{LCO} MEASUREMENTS DURING EXERCISE IN MAN.
A. Holmgren (Hosp. for Infectious Diseases, Clin. Physiol. Lab., Stockholm, Sweden).
Scandinavian Journal of Clinical and Laboratory Investigation, vol. 17, 1965, p. 110-116. 23 refs.
Swedish Natl. Assoc. Against Heart and Chest Diseases supported research.

The pulmonary carbon monoxide diffusion capacity (D_{LCO}) during steady state was studied in a group of healthy subjects. Alveolar CO tension (P_{ACO}) was calculated under the assumption that the CO and CO_2 dead space were the same, and that arterial CO_2 tension could be taken as an approximate estimate of the alveolar CO_2 tension. The variation in data was 7.2%. The introduction of correction for the pulmonary mean capillary CO pressure eliminated the effect of CO accumulation in blood during repeated measurements. The corrected values were consistently higher (3.8 ml/min/mm Hg) than those not corrected.

A65-81321
ON THE SIGNIFICANCE OF PULMONARY MEAN CAPILLARY CO BACK PRESSURE CORRECTIONS FOR REPEATED MEASUREMENTS OF D_{LCO} DURING EXERCISE IN MAN.
A. Holmgren (Hosp. for Infectious Diseases, Clin. Physiol. Lab., Stockholm, Sweden).
Scandinavian Journal of Clinical and Laboratory Investigation, vol. 17, 1965, p. 117-122. 21 refs.
Swedish Assoc. Against Heart and Chest Diseases supported research.

Steady state pulmonary diffusing capacity for carbon monoxide (D_{LCO}) during exercise was determined using 0.05 percent CO in air mixture with and without correction for back pressure of CO in pulmonary capillary blood. Four determinations were performed in each of 38 normal subjects. The results illustrate the quantitative effect of correcting for CO back pressure, which becomes of increasing importance when repeated measurements are performed. In routine determination of D_{LCO} during moderate exercise the corrected D_{LCO} can be predicted as [uncorrected D_{LCO}] x 0.97 + 4.6, without actual determination of carbon monoxide saturation in blood (S_{BCO}), and the error of the estimate then amounts to 3.7 percent.

A65-81322
ON THE PSYCHOLOGICAL EFFECTS OF CHRONIC MILD HYPOXIA [UBER DIE PSYCHISCHEN AUSWIRKUNGEN LEICHTEN CHRONISCHEN SAUERSTOFFMANGELS].
R. Kuhn (Kantonale Thurgauische Heil- und Pflegeanstalt Münsterlingen, and Fliegerärztliche Inst. der Schweiz. Armee, Dübendorf, Switzerland)
Aktuelle Fragen der Psychiatrie und Neurologie, vol. 2, 1965, p. 122-143. 23 refs. In German.

The experiments described were carried out at the Alpine Research Station on the Jungfraujoch (3454 m. above sea level) for six days in 1942, eight days in 1943, and 12 days in 1944. It was hoped to gain insight in the effect of low degree of hypoxia on sensory, motor, and intellectual functions as well as on behavior. Among the tests used were mental arithmetic, writing samples, Bourdon test, Jung's association experiment and Rorschach ink blots. Analysis of results relates them to more recent findings in the field of psychopathology of organic brain damage.

A65-81323
ON THE CHLOROPHYLLS SEPARATED BY PAPER CHROMATOGRAPHY FROM CHLORELLA EXTRACTS.
M.-R. Michel-Wolwertz and C. Sironval (Gorsem, Res. Sta., Lab. of Plant Physiol., Sint-Truiden, Belgium)
Biochimica et Biophysica Acta, vol. 94, Mar. 29, 1965, p. 330-343. 27 refs.

Several chlorophylls were found to be present in low quantities in Chlorella extracts besides standard chlorophyll a and b. They included chlorophyll a and b isomers, allomerized chlorophyll, chlorophyllides and a particular protochlorophyll-like pigment. The chromatographic separation and some of the properties of these special chlorophylls are described. Their possible nature is discussed.

A65-81324
OBJECTIVE MEASURE OF MENTAL OVERLOADING: NEW APPLICATIONS OF THE DOUBLE-TASK METHOD [MESURE OBJECTIVE DE LA SURCHARGE MENTALE NOUVELLES APPLICATIONS DE LA METHODE DES DOUBLES TACHES].
J. W. H. Kalsbeek (Jan Swammerdam Inst. Toegpast Natuurw. Onderzoek, Lab. de Psychol. Ergonomique, Amsterdam, The Netherlands).
Travail Humain, vol. 28, Jan.–Jun. 1965, p. 121–132. 13 refs. In French.

This study is a first step to a closer qualitative description of the step by step deterioration in performance of complex behavior patterns brought about by occupying the subject mentally with another task to which he must give preference. This is the method of experimentally induced distraction stress. The primary task consisted of pressing a pedal at the left or right in response respectively to a low and a high tone presented in random order through earphones. The step by step disintegration of handwriting when combined with the primary task resembled the deterioration brought about by pathological causes (fatigue, anoxia, etc.), and may be described in terms of a shift to lower levels of organized behavior. The characteristics of each level were studied in order to establish a scale. The different levels were interpreted as defence strategies adopted by the central nervous system in order to avoid overloading. These strategies may be treated as "symptoms" of overload when they are adopted without distraction stress. Thus the mental load involved in task performance may be related to the known amount of distraction stress experimentally induced by the same strategies.

A65-81325
RESULTS OF STUDIES OF THE BIOLOGICAL EFFECTIVENESS OF VARIOUS FACTORS IN COSMIC FLIGHT [REZUL'TATY ISSLEDOVANIIA BIOLOGICHESKOI EFFEKTIVNOSTI RIADA FAKTOROV KOSMICHESKOGO POLETA].
V. V. Parin, V. V. Antipov, B. I. Davydov, E. F. Panchenkova, G. A. Chernov, and A. I. Nesterenko
(Intern. Astronautical Congr., 15th Warsaw, Sep. 7–Oct. 12, 1964).
Kosmicheskie Issledovaniia, vol. 3, Mar.–Apr. 1965, p. 315–324.
43 refs. In Russian.

The validity of dynamic data on blood serotonin and ceruloplasmin activity in evaluating the biological effect of vibration, acceleration and ionizing radiation during space flight was tested on experimental animals. Four series of experiments were conducted: (1) Mice and guinea pigs were subjected to vertical vibrations of 35 and 70 cps frequency and 0.4 mm amplitude for 15 and 60 min; and to 700 cps frequency at an amplitude of 0.005 mm for 60 min. (2) Mice were subjected to 10 and 30 g for 5 and 30 min. (3) Mice, rats, guinea pigs, dogs and monkeys were exposed to 540, 600, 800 and 900 r. of gamma radiation. (4) Dogs were exposed to the combined effect of acceleration or vibration. The animals were subjected to vibration (70 cps, 0.4 mm 60 min) or acceleration (8g, 3 min) 2 to 24 hours before being exposed to CO^{60} radiation (3.4 r./min) at a total dose of 100 r. The results show that methods used for determination of serotonin and ceruloplasmin levels were sufficiently sensitive for appraisal of biological effects of factors connected with space flight.

A65-81326
PSYCHOLOGICAL MECHANISMS IN PILOT ERROR.
D. Russell Davis (Cambridge, U., Great Britain)
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and S. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.)
The Hague, Mouton and Co., 1964, p. 11–23. 16 refs.

In association with anxiety, there occur marked changes in perception as well as in motor responses. Although all the changes affecting performance may be due to mechanisms of biological value, they may well be disadvantageous and maladaptive when they occur in pilots, and to them may be attributed many of the errors made by pilots under stress. Such errors may be prevented by a) preventing conditions arising in which the outcome of a task comes into doubt, and b) training the pilots so that they can stand up to stress without becoming disorganized. There is now a substantial body of evidence to show that the method of training affects the degree to which stresses can be tolerated. When a crisis does arise, errors are made because of the instability of perception and "the disintegration of the sensory field." These processes can be cut short by giving the pilot more information as providing him with a concept which integrates the information available.

A65-81327
THE PREDICTION OF LIABILITY TO FLYING ACCIDENTS.
A. Cassie (Air min., U. K., London, Great Britain)
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, p. 24–29.

A long-term study of flight accident prediction has been started by gathering a complete record of all entrants in pilot training over a seven year period, each of whom will be followed up for seven years after his entry. The data gathered on each entrant are: a) marital status, b) age, c) education, d) pre-service training, e) sports and games by type and achievement, f) interests and hobbies, g) examinations, h) civilian occupation, i) previous military service, j) medical background, k) flying experience, l) family background, m) subsequent training history, n) selection scores, and o) summary of accident where relevant. The final analysis is projected into 1967. A pilot study was carried out by matching each subject who has had an accident with three accident-free pilots flying on the same course. The accidents were divided into two main categories– technical and pilot error. The pilot error group had lower mean scores on the Pilot Index and the Paper and Pencil Mechanical Aptitude Test at 5% level of significance and on the Instrument Comprehension Test at 10% level of significance. In personal history the pilot error group differed from controls in the number of previous accidents, injuries, and illnesses reported.

A65-81328
PSYCHOLOGICAL FACTORS IN THE TRAINING OF STUDENT PILOTS.
K. Steininger (Deut. Versuchsanstalt für Luft Fahrt, Bad Godesberg, West Germany)
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, p. 33–44.

The psychological causes of flight errors cannot be deduced by the instructor solely from his observations of the student's reactions and behavior in the aircraft during flight. Although flight errors appear as simple functional errors, they are determined by motivational influences and personal psychological attributes rather than merely through lack of skill. It is suggested therefore that the student pilot's qualification is determined more by the nature of his motivation and the stability of his character than by overt talents or skills. Since the psychological backgrounds of one and the same flight error may vary in different students, the pass–fail criterion is unsuitable for determining the validity of a single test. It can only be taken into account in order to validate the total test battery and procedure of pilot selection. Validation of single tests against the criterion of flight instructor's ratings requires not only a very different form of analysis, it also calls for the training of instructors in judging the various factors which to to make up each flight performance by the student.

A65-81329
SOME STUDIES OF FLYING PROFICIENCY.
M. Wächter.
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, p. 45–49.

This is an account of three studies in progress at the Swedish Institute of Military Psychology on different aspects of criteria for flying proficiency. In the first study around 70 instructors at the Flying Training School were interviewed on the essential criteria of flying proficiency in their experience, on their rating of students in specific, precise terminology, and on their evaluation of different phases of training. The gathered material points to the lack of agreement among instructors on terminology and its meaning. The second study is a follow-up in form of a case study on 27 students in basic training. Emotional factors were found to be related closely to performance in training. The third study involves the relation of ratings on the sixteen factors used by Cattell (The Sixteen Personality Factor Questionnaire, Cattell et al) to flying proficiency.

A65-81330
A FUNDAMENTAL POINT OF VIEW FOR THE PSYCHOLOGICAL EXAMINATION AND SELECTION OF PILOT TRAINEES FOR THE ROYAL DANISH AIR FORCE.
E. Tranekjaer Rasmussen (Copenhagen U., Denmark)
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, p. 59–70.

The psychological examination for selection of pilot trainees in the Royal Danish Air Force includes two types of tests: 1) psychotechnical tests aimed at prediction of motor abilities, and 2) characterological tests. The guiding principle is a global evaluation of test results with emphasis on "the interdependency of different tests." Two of the more interesting psychomotor apparatus-tests, the "Steer Test" and the "Instrument Test" explore the

candidate's capacity for handling competing simultaneous activities and simultaneous reading of several instruments. The three intelligence tests are evaluated as a unit. Personality tests, autobiography, general knowledge test, gymnastics and depth interview round out the picture on each candidate. In the last stage, board members discuss and interview the candidate before the final ruling.

A65-81331
PREDICTION OF PERFORMANCE IN THE EARLY STAGES OF FLYING-TRAINING.
D. J. James (Air Min., London, Great Britain)
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, p. 77-82.

Some of the problems of prediction of performance in early stages of flight training are reviewed. Selection of the criteria for test validation is complicated by the low reliabilities of the failure rate and marks recieved after 130 hours of flying. Also the high degree of selection on a number of dimensions throughout the flight training and officer training phases contributes towards low validities and reliabilities of the tests. Among the individual tests used to select pilots, two psychomotor apparatus-tests have proved to be effective predictors of failure to fly, while the two paper tests (mechanical reasoning, and instrument comprehension) were predictors of both the wastage and marks to a certain extent. Failure at flying due to inability to navigate or orientate oneself with respect to the airfield and other aircraft led to the development of a shape-recognition test for inclusion in the selection battery. Further a machine has been developed for recording, scoring, and quantifying breakdown of skill under stress.

A65-81332
RESULTS OF THE SELECTION OF R.N.A.F. AIR TRAFFIC AND FIGHTER CONTROL OFFICERS.
J. C. Helbing. (Min. of Defense, the Hague, Netherlands).
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, p. 71-76.

A battery of selection tests was given to a group of applicants for the post of air traffic control officer and a group of fighter (interception) control officers at the Royal Netherlands Air Force. These predictors were correlated with the pass-fail criterion at the air traffic control and fighter control schools and with the on-the-job criterion one year after graduation. A global survey of the series of validity coefficients shows significant differences between the requirements for both jobs. Both positions demand spatial and numerical abilities and an independent personality. More specific qualifications for air traffic control officer are: abstract reasoning, verbal ability, and an interest in aviation. The interception controller's intellectual requirements lie in the spatial-visualization-reasoning area. Motivation seems to be less important, but maturity and leadership qualities are of importance.

A65-81333
PSYCHOLOGICAL CORRELATIONS OF HYPOXIA-STRESS TOLERANCE.
Rudiger Seifert (Deut. Versuchsanstalt für Lüftfahrt, ev, inst für Flugmed., Bad Godesberg, West Germany).
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, p. 103-109.

Two hundred and forty-five subjects were tested with respect to their hypoxia-stress tolerance using two previously established criteria: 1) the "time reserve" — the time during which the subject is still able to react and act sensibly in a dangerous flight situation, and 2) the "functional efficiency reserve" — the period of time a pilot can stand the stress without injury. The subjects performed a psychomotor test (Kugeltest developed by Brüner, H. et al) at 23,000 feet simulated altitude. Two other tests were administered under stress-free conditions: a) the Steinwachs test of oscillations in writing pressure on a balance, and b) Z-test (Zulliger, H., 1948). The findings are discussed in relation to the above criteria, of which the "time reserve" seems to be highly connected to psychological factors, while the "functional efficiency reserve" is apparently almost exclusively a physiological criterion.

A65-81334
VISUAL PRESENTATION OF AIRCRAFT INFORMATION.
A. J. Cruise (Min. of Aviation, London, Great Britain)
IN AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, p. 110-125. 10 refs.

Some experimental work in providing new techniques of visual information display has been undertaken and the possibilities of providing effective integration of the external and internal visual information displays have been investigated. Results of the initial studies of such systems and the assessment of pilot's operation with them are included to indicate the methods adopted for evaluating these display and presentation systems. At this stage many military installations are flying with collimated projected electronic displays; i.e., simultaneous combination of operational and internal visual information has been achieved. Initial flight trials of the color map system are in progress and the electronics of this are developed for superimposition of data required for navigation, for target attacks and for air traffic control. An integrated visual information system is described.

A65-81335
POSSIBILITIES OF THE BODY ADAPTATION TO THE DAY AND NIGHT SHIFT WORK [O VOZMOZHNOSTI PRISPOSOBLENIIA ORGANIZMA K SMENNYM I NOCHNYM RABOTAM].
G. M. Gambashidze (USSR, Acad. of Med. Sci., Inst. of Hyg. Labor, and Profess. Diseases, Moscow).
Gigiena Truda i Professional'nye Zabolevaniia, no. 1, Jan. 1965, p. 12-17. 7 refs. In Russian.

Studies were conducted on workers in bakeries, who changed from day to night shifts every third week, and subway workers, who worked only night shifts continuously. The physiological changes studied were body temperature, pulse rate, blood pressure, and wrist muscle response to a static load. The visual-motor latent period was also determined. A daily rhythm of all the functions studied was noted, which affected performance at different times of the day. The results indicate that methods of relieving fatigue by periods of physical exercise and rest should be different for different shifts. The most important factor, however, in improving performance during night shift was found to be adequate sleep during the day.

A65-81336
LONG-RANGE PROGRAM TO DEVELOP MEDICAL MONITORING IN FLIGHT: THE FLIGHT RESEARCH PROGRAM-I.
James Roman (NASA Flight Res. Center, Office of Biol. Res. and Med. Operations, Edwards, Calif.).
Aerospace Medicine, vol. 36, Jun. 1965, p. 514-518.

NASA's Flight Research Center is conducting a long-range program designed to advance the state of the art in biomedical monitoring. Better knowledge of the physiological parameters used in monitoring the crew is one of major aims of the program. An instrumentation-development phase and a phase involving development of computer techniques for handling medical flight data both contribute to the overall program. The physiological-parameters-research phase and the instrumentation-development phase have yielded significant results after one year of operation.

A65-81337
PURE-TONE ACUITY AND THE INTELLIGIBILITY OF EVERYDAY SPEECH.
J. D. Harris (U. S. Naval Submarine Med. Center, Groton, Conn.).
Journal of the Acoustical Society of America, vol. 37, May 1965, p. 824-830. 15 Refs.

Certain laboratory studies show that it is necessary only to hear up to 1500, or perhaps 2000, cps for normal work-list reception. However, many patients with normal hearing up to 2000 cps but deficiencies at higher frequencies have noticeable difficulty with everyday speech. The discrepancy may arise since ordinary speech is often distorted and/or masked, conditions not usually included in speech-reception studies. Discrimination scores (DS) for sentence material were collected on 52 sensorineural hypoacusics, the speech being distorted by having talkers wear nose clamps, by speed, interruptions and reverberations. When the mean DS from these four distortions was averaged with the DS for undistorted speech, to create "50% distorted speech," a condition asumed to represent everyday listening, the important acuities were at 1000, 2000, and 3000 cps. The formula for predicting everyday speech should then utilize the simple average hearing loss at these three frequencies. The Pearson r between this predictor and the DS for 50% distorted speech was 0.74. Multiple-correlation frequency-weighting techniques are inferior to simple averaging across audiometric frequencies for theoretical reasons and because of the almost insurmountable problem of collecting a truly representative sample of hearing-loss patterns. These results confirm those of Kryter, Williams, and Green, who found the region 2000 to 4000 cps to be the important predictor for reception of loud speech heavily masked by noise.

A65-81338
OXYGEN SUPPLY OF THE BRAIN DURING CIRCULATORY HYPOXIA [O KISLORODNOM SNABZHENII MOZGA PRITSIRKULIATORNOI GIPOKSII].
E. A. Kovalenko and V. B. Koziner (Central Inst. of Hematol. and Blood Transfusion, Lab. of Pathol. Physiol., Moscow, USSR).

Fiziologicheskii Zhurnal SSSR, vol. 51, May 1965, p. 547–553. 16 refs.

During induced circulatory hypoxia in dogs, a decrease in volume of the circulating blood may reduce brain-tissue O_2 tension to 60% of normal. But normalization takes place due to changes in the brain circulation. However, prolonged lowering of the brain-tissue oxygen tension to 50% of normal or less, which occurs when the arterial blood pressure falls to 10% to 15% of normal, the spontaneous normalization was not observed. In this case inhalation of pure oxygen was required to bring the brain tissue oxygen tension to a normal level. The actual factor, however which determines the chance of survival under hypoxic conditions is the oxygen tension in the brain tissues and in the venous circulation.

A65-81339
PRODUCTION OF THIAMINE, RIBOFLAVIN, FOLIC ACID, AND BIOTIN BY CHLORELLA VULGARIS AND CHLORELLA PYRENOIDOSA.
Robertson Pratt and Evelyn Johnson (Calif. U., San Francisco Med. Center, School of Pharm.).
Journal of Pharmaceutical Sciences, vol. 54, Jun. 1965, p. 871–874. 14 refs.
Calif., U. supported research.

In C. vulgaris and C. pyrenoidosa the concentrations of thiamine, riboflavin, folic acid, and biotin relative to dry weight of cells rise to a maximum during approximately the first third to half of the 3-week culture period and then decline. Despite the decrease in concentration during the latter portion of the growth period, there is a substantial increase in the absolute quantity of thiamine, riboflavin, and biotin in the cultures because of the large increment in total cell mass, but the folic acid does not conform to the general pattern and decreases in absolute amount as well as in concentration. None of the vitamins studied, except riboflavin, appears to accumulate in the external medium in appreciable quantities. But the amount of riboflavin in the external medium increases continuously in cultures of both species of Chlorella and, in cultures of C. pyrenoidosa, equals or exceeds the amount present in the cells at the end of a 3-week growth period. In general, C. pyrenoidosa excels C. vulgaris as a source of the vitamins studied, whether yield is expressed relative to dry weight of cell mass or in terms of total amount present in the culture. The superiority is greatest in young cultures and diminishes as age of the cultures increases. As potential sources of the four vitamins studied, both species of Chlorella compare favorably with conventional dietary vegetable sources.

A65-81340
ON THE INFLUENCE OF ABRUPT DISTURBANCE OF THE RHYTHM OF DAILY LIFE UPON THE CAPACITY FOR WORK AT ONE'S OCCUPATION.
L. A. Veidner-Dubrovin and N. A. Matiushkina (P. F. Lesgaft Inst. of Phys. Culture, Leningrad, USSR)
(Voprosy psikhologii, Jul.–Aug. 1964, p. 61–68).
Soviet Psychology and Psychiatry, vol. 3, Spring 1965, p. 10–16. 9 refs.
Translation.

Human fatigue and, as a consequence, impairment of man's occupational work capacity under the influence of a severe violation of the daily rhythm of vital functions are manifested in an increase in the time required to perform occupational operations and in an increase in the instability of individual indicators of the performance of these operations. The greatest instability of individual indices (as compared to the initial data obtained under ordinary conditions) was observed in the performance of occupational operations and actions based upon finely coordinated motor activity. The least change is seen in the performance of work chiefly involving speed and requiring displacement of the body in space.

A65-81341
ROLE OF APPARENT SLANT IN SHAPE JUDGMENTS.
Wilma A. Winnick and Ilana Rogoff (N.Y. City U., Queens Coll., New York).
Journal of Experimental Psychology, vol. 61, Jun. 1965, p. 554–563. 14 refs.
N. Y. City U. supported research.

Two parallel experiments are reported bearing on the shape–slant invariance hypothesis. Apparent-objective slant scales were first determined for four rectangles, two trapezoids, a random shape, and an ellipse. Apparent slant was found to be less than objective slant at 10°, 20°, and 30°, and to be greater at 60° and 80°; accuracy was achieved at close to 40°. Shape judgements were then measured for the same forms set at the same angles. The obtained increases in the quantity a–p as a function of slant agreed with predictions from the slant scales. Not predicted was the finding of overconstancy at 10° and 20°.

A65-81342
RECOGNITION MEMORY FOR RANDOM SHAPES AS A FUNCTION OF COMPLEXITY, ASSOCIATION VALUE, AND DELAY.
Herbert James Clark (Ill. U., Urbana).
Journal of Experimental Psychology, vol. 69, Jun. 1965, p. 590–595. 12 refs.

Twelve groups of 24 subjects each were examined on 2 tests at 3 delays for recognition accuracy of random shapes having 2 levels of complexity and 2 levels of association value (A). A measure of form coding was also taken. Forms of high A were more accurately recognized than forms of low A, and a second recognition test on the same forms resulted in a practice effect for simple but not for complex forms. All delay effects were insignificant. Complex form coding was positively related to A. Simple form coding was infrequent and not related to A. Coding was positively related to a recognition accuracy for complex forms only. Conclusions were: (a) subjects probably stored an uncoded image of the entire shape of simple, but not of complex forms; and (b) complex forms were presumably remembered by making associations to them.

A65-81343
REACTION TIME TO CHANGES IN THE INTENSITY OF WHITE NOISE.
David H. Raab and Mitchell Grossberg (N.Y. City U., Brooklyn Coll., New York).
Journal of Experimental Psychology, vol. 69, Jun. 1965, p. 609–612. 17 refs.
Brooklyn Coll. supported research.
Grant NSF GB-1118.

Reaction time to a noise burst (ΔI) added to ongoing noise (I) was found to decrease with increasing ΔI and with decreasing I. For constant values of $\Delta I/I$, RT generally decreased with increasing I – a finding of significance for decision models of RT.

A65-81344
ON THE EFFECT OF HIGH O_2-PARTIAL PRESSURES ON RESPIRATION IN CHRONICAL HYPOXEMIA / UBER DIE WIRKUNG HOHER O_2-PARTIALDRUCKE AUF DIE RESPIRATION BEI CHRONISCHER HYPOXAMIE .
R. Mürtz and A. H. Begenat (Med. Akad. Dusseldorf, I. Med. Klin., West Germany).
Zeitschrift für die gesamte Experimentelle Medizin, vol. 139, 1965, p. 166–177. 35 refs. In German.

In 23 subjects (4 healthy men, 3 patients with acyanotic congenital heart diseases, and 16 patients with cyanotic congenital heart diseases) pulmonary ventilation was studied under normal conditions and in hyperoxia. At the beginning of hyperoxia (85% O_2 in air) ventilation decreased for two or three minutes in all groups and then increased again slightly. In the healthy subjects the smallest ventilatory minute volume at the beginning of oxygen inhalation was -19.4% of the ventilation under normal conditions. The same results were obtained in 16 patients with chronic shunt-hypoxemia; the respiration at the time of the most intense depression of ventilation was in these cases -14.00%. This constitutes only a part of the hypoxic drive since normoxemia could not be obtained. Nevertheless this represents a change in pulmonary ventilation of approximately 15% per 10 mm Hg change in arterial oxygen tension. These findings indicate that even after adaptation to chronic hypoxia, the hypoxic stimulus from the chemoreceptors is still an important factor in the regulation of respiration.

A65-81345
PERSONAL PROTECTION IN NOISE EXPOSURE.
M. Thomas Summar (East Range Clin., Dept. of Ind. Med., Virginia, Minn.) (Symp. on Noise Effects and Hearing Conserv in Ind., Virginia, Minn., Jun. 4–5, 1964).
Journal of Occupational Medicine, vol. 7, Jun. 1965, p. 279–280.
Symp. sponsored by East Range Clin.

In many situations it is not possible to reduce exposure to noise at the source. Adequate protection can be obtained by ear protectors, such as plugs or muffs. For frequencies above 1000 cps, muffs give the same protection as plugs; but below 1000 cps certain types of muffs give slightly more protection. Attenuation given by these devices may be 20 to 30 dB. below 1000 cps, and 30 to 40 dB. in the higher frequencies. Choice of plugs or muffs depends on the type of operation, the type and level of noise, type of exposure, and expense. There are advantages and disadvantages to either type of ear protection. All aspects of a particular job must be evaluated. Regardless of the type of protector used, fitting should be done by a physician. All employees should be given instruction in ear protection. In some cases, individuals hear better with ear protectors. The reason is not clear, but is probably related to reducing the distortion of the spoken voice by decreasing the outside noise.

A65-81346
LINEARIZATION OF EVOKED RESPONSES TO SINE WAVE-MODULATED LIGHT BY NOISE.
H. Spekreyse and L. H. Van der Tweel (Amsterdam U., Lab. of Med. Phys., The Netherlands).
Nature, vol. 205, Feb. 27, 1965, p. 913. 7 refs.
U.S. Navy European Res. Program Contract N62558-2701.

Non-amplitude dependent distortion of signal transmission in the visual system was investigated, more specifically, the phenomenon of a nearly pure 10 cps response found with the modulation at 5 cps in the occipital leads of the electroencephalogram. The results suggest that this distortion is not caused at a late stage in the system.

A65-81347
ACCELERATION REGISTROGRAPHY: A NEW METHOD OF EXAMINATIONS CONCERNED WITH THE LABYRINTHINE RIGHTING REFLEX.

Masaaki Kitahara (Iwate Med. Coll., Dept. of Otorhinolaryngol., Morioka, Japan).
Annals of Otology, Rhinology and Laryngology, vol. 74, Mar. 1965, p. 203–214. 8 refs.

In order to improve examinations concerned with the labyrinthine righting reflex, the author devised acceleration registrography. In this method accelerations caused by changes in the position and movement of the head of the subject, both in dynamic and static process, can be registered with an unbonded strain-gage-type linear accelerometer attached to the head of the subject. As one of the examinations related to the labyrinthine righting reflex, improved by applying this method, a special tilt test was introduced in this paper. In using this method, the head righting reflex of the subject standing erect on the tilt platform was precisely measured. With results obtained from normal adults and patients with vertigo, the author was able to confirm that this test is valuable as a clinical functional test.

A65-81348
NORMAL VALUES OF CARDIOVASCULAR FUNCTION DURING PHYSICAL WORK. II. THE INFLUENCE OF BODY SURFACE AREA ON HEART MINUTE VOLUME. III. THE DEPENDENCY OF MINUTE VOLUME UNDER STRESS ON AGE [DAS NORMALVERHALTEN DER FUNKTIONSGROSSEN DES KREISLAUFS UNTER KORPERLICHER ARBEIT. II. MITTEILUNG: DIE ABHANGIGKEIT DES HERZMINUTENVOLUMENS VON DER KORPEROBERFLACHE. III. MITTEILUNG: DIE ABHANGIGKEIT DES HERZMINUTENVOLUMENS UNTER BELASTUNG VOM LEBENSALTER].
W. Noder (Münster U., Bäderwiss. Inst. des Staatsbades Salzuflen, West Germany).
Archiv für Kreislaufforschung, vol. 45, Dec. 1964, p. 19–33. 14 refs. In German.

A total of 421 measurements of heart minute volume during physical exercise was carried out in 137 men with healthy cardiovascular systems. Heart minute volume was shown to be proportional to body surface area when other conditions were held constant. Investigations of the effect of age on the heart minute volume during physical exercise showed no statistically significant effect in 129 male subjects with healthy cardiovascular systems, ages ranging from 20 to 59 years.

A65-81349
SOUND DIFFRACTION IN THE VICINITY OF THE HUMAN EAR.
A. C. Temby (Commonwealth Acoustic Labs., Sydney, Australia).
Acustica, vol. 15, 1965, p. 219–222.

The experiment was designed to investigate the relative diffraction and shadow effects in the vicinity of the human ear, with a view to finding the optimum position for microphone mounting of an ear-level hearing aid. Five microphone positions, two in front of, and three behind, the ear were investigated using 0.1 octave bandwidth noise with center frequencies of 800, 1600, 2400, 3200 and 4000 cps. Results were obtained using ten adult subjects and showed that microphone situated in the ear, or just in front of the ear on the cheek, gives consistently higher outputs of as much as 4 dB than for any in the behind the ear mounting positions for sound azimuths (θ) of $-60^{0} \leq \theta \leq 60^{0}$; the 0^{0} azimuth occurs when the subject is directly facing the sound source.

A65-81350
A CONTRIBUTION TO THE RELATION BETWEEN LOUDNESS AND NUISANCE VALUE OF NOISES [BEITRAG ZUR RELATION ZWISCHEN LAUTSTARKE UND LASTIGKEIT VON GERAUSCHEN].
H. Niese (Tech. U., Inst. für Elektro- und Bauakustik, Dresden, East Germany).
Acustica, vol. 15, 1965, p. 236–243. 11 refs. In German.

The stress value of noise was investigated experimentally to clarify the objective and subjective components. The subjects judged various noises with uniform broadband and with sinusoidal frequency characteristics by comparing them with a broadband uniform noise source as to their loudness and nuisance value. The results show that there is no difference between the loudness and nuisance value with uniform broadband noises, while with pulsating noises the nuisance component is felt as being distinct from the loudness aspect.

A65-81351
THE EFFECT OF VAGUS BLOCKING ON TEMPERATURE REGULATION DURING INTERVAL COOLING [DER EINFLUSS DER VAGUSAUSSCHALTUNG AUF DIE TEMPERATURREGULATION BEI INNERER KÜHLUNG].
Masami Iriki and Karl-August Meurer (Max Planck-Ges., W. G. Kerckhoff-Inst., Bad Nauheim, West Germany).
(Deutsche Physiol. Ges., 29th Meeting, Bad Nauheim, Germany, April 30–May 2, 1964).
Pflügers Archiv für die gesamte Physiologie, vol. 283, 1965, p. 203–212. 9 refs. In German.

In lightly anesthetized dogs, immersed in a warm water bath, shivering was induced by lowering the temperature with a thermode placed into the esophagus. During internal cooling or between two cooling periods bilateral cervical vagotomy or cold blockade of both vagal nerves were performed. Transection of cold blockade of both vagal nerves did not abolish shivering and the increase of heat production during internal cooling. There was no evidence for a difference in the amount of heat production between vagotomized and nonvagotomized dogs.

A65-81352
BIOCHEMICAL INDICES OF SERUM AND RECUPERATION AFTER PHYSICAL EFFORT [INDICES BIOCHIMIQUES DU SERUM ET LA RECUPERATION APRES L'EFFORT PHYSIQUE].
C. Haralambie and Genoveva Jeflea (Centre d'Entrainement et de Rech. Sci., Lab. de Biochim., Bucarest, Rumania)
Internationale Zeitschrift für angewandte Physiologie, vol. 20, 1965, p. 515–520. 12 refs. In French.

Results of observations made on athletes during intense training and the day following a series of days of activity show that the study of proteins, lipoproteins, and glycoproteins of the serum, of sialic acid, and of urea, give data of great use for the doctor of athletes and for coaches. These data are indicative of the athlete's state of health and his biological adaptation to stress, represented by repeated effort. Such determinations are besides more sensible and significant than the usual examinations in view of precision recovery of athletes after a short period of rest, following training.

A65-81353
EFFECT OF VESTIBULAR AND OPTOKINETIC STIMULATION OF POTENTIAL FREQUENCY OF THE ELECTROENCEPHALOGRAM [IZMENENIIA CHASTOTNOGO SPEKTRA ENTSEFALOGRAMMY CHELOVEKA PRI VESTIBULIARNYKH I OPTOKINETICHESKIKH VOZDEISTVIIAKH].
M. P. Aronov (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).
Fiziologicheskii Zhurnal (USSR, vol. 51, Apr. 1965, p. 413–419. 20 refs. In Russian.

When subjects were revolved in a Barany chair with their eyes closed, the electroencephalogram showed a decrease in amplitude of all brain waves except those in the 2 to 3 cps range. Simultaneous stimulation of vestibular and optokinetic centers (when the subjects were revolved watching a circular screen, which was either all white or consisted of alternating dark and white vertical lines) decreased only the amplitude of the alpha-rhythm, with an increase in amplitudes in the 2 to 3 cps and, in some cases, the 22 to 33 cps frequency ranges. When the persons were subjected to optokinetic stimulation without vestibular stimulation, that is, watching a moving screen without being revolved, the electroencephalogram resembled the one produced during the rotation with eyes closed. Results after rotation with eyes open indicate, that the increase in the amplitudes of low frequencies could be the effect of superimposition of the electronystagmogram upon the electroencephalogram distorting the true picture of analyzer values. It is possible also that the results could be due to interference of the electromyogram, because the activity of the cervial muscles during rotation in the lighted room was higher than in darkness.

A65-81354
ELECTRICAL ACTIVITY OF THE CEREBRAL CORTEX IN MONKEYS OF DIFFERENT AGES IN RESPONSE TO RHYTHMICAL LIGHT FLASHES [ELEKTRICHESKAYA AKTIVNOST' KORY BOL'SHIKH POLUSHARII OBEZ'IAN RAZNOGO VOZRASTA PRI RITMICHESKIKH SYETOVYKH MEL'KANIIAKH].
T. G. Urmancheeva and G. M. Cherkovich (USSR, Acad. of Med. Sci., Inst. of Exptl. Pathol. and Therapy, Lab. of Physiol. and Pathol. of Higher Nervous Activity, Sukhumi).
Fiziologicheskii Zhurnal SSSR, vol. 51, Apr. 1965, p. 431–440. 18 refs. In Russian.

During the first days of life, baboons and macaques showed a definite response in the occipital electroencephalogram to light flashes of 5 to 10 flashes per second, and a very weak response to frequencies of 15 flashes per second. Marmosets responded to a greater range of 5 to 20 flashes per second. After further growth (up to 7 months) this ability was improved in all three genera. Between the third and eighth month of life, a definite relationship was noted between the response to light flashes and the background of potential activity. Between the ages of eight months and two years, stabilization was noted within the range of 5 to 24 flashes per second. However, during all phases of life, the marmosets showed a better response than baboons and macaques. This response showed a decrease in adults of 15 to 20 years, and in older adults (27 years) it disappeared completely.

A65-81355
THE APOLLO PROGRAM.
C. C. Lutman (Headquarters AF Systems Command, Washington, D.C.)
Air University Review, vol. 16, May–Jun. 1965, p. 16–21.

The Apollo spacecraft is composed of three modules, each designed to fulfill specific mission requirements: (1) The command module houses the three-man crew, serves as the control center for spacecraft operation, and is designed to safely reenter the earth's atmosphere at a velocity of about 25,000 miles per hour upon return from the moon. (2) The service

module houses many of the spacecraft support systems and the major propulsion system for mission abort, midcourse corrections, and injection into and out of lunar orbit. (3) The lunar excursion module is a special-purpose shuttle or space ferry for the two men who make the lunar landing and contains the necessary systems for descending from lunar orbit, performing the lunar landing and takeoff, and accomplishing the lunar orbit rendezvous with the command and service modules. The program requires a huge network of tracking and data-acquisition stations and the support of scientists, engineers and medical crews.

A65-81356
APPLICATION OF TELEMETRY TECHNIQUES TO HARD LINE TRANSMISSION OF BIOMEDICAL INFORMATION ON THE 50-FOOT HUMAN CENTRIFUGE.
M. Freed (U.S. Naval Air Develop. Center, Johnsville, Pa.).
IN: PROC. OF THE 1965 NATL. TELEMETERING CONF., HOUSTON, TEX., APR. 1965.
New York, Lewis Winner, Apr. 1965, p. 56-58.

A description is given of the problems in collecting physiological information during simulated space missions on the human centrifuge. Body temperature, respiration, blood pressure, heart sound, and electrocardiograms were some of the parameters tested. After much experimentation it was realized that standardization of components was needed. Small operational amplifiers (solid state) were used in the final signal conditioning system in use on the human centrifuge. A general description of these amplifiers is given, and examples in collecting various data on blood and heart function are cited. A pulse tone carrier system for multiplexing groups of signals into a single circuit is described. This is a telegraph tone-type telemetering system which needs neither calibration nor compensation. Problems with Dataphone transmission and digital presentation of data are also discussed. It is concluded that the automatic reduction system for rendering the data to a usable form is an advance in the elimination of needless waste of collected information.

A65-81357
COMPUTERS IN CARDIOVASCULAR SIMULATION.
D. E. Kolbert and P. I. Wolf (Control Data Corp., Minneapolis, Minn.).
IN: PROC. OF THE 1965 NATL. TELEMETERING CONF., HOUSTON, TEX., APR. 1965.
New York, Lewis Winner, Apr. 1965, p. 229-232. 9 refs.

Many computer oriented researchers are keenly aware of the limitations imposed by either pure analog or pure digital computer analysis of real-time physiologic data. A particularly vexing situation is encountered when analysis and simulation of closed-loop biological systems (e.g., cardiovascular system) is attempted. A system which combines the best properties of both is used at the Latter Day Saints Hospital in Salt Lake City, Utah. Time-shared programs, an anlog-digital interface system, and system operation, and application are described and discussed. Application of the system includes the study of blood chemistry, neurophysiologic systems, cardiovascular diseases, and cardiovascular systems analysis.

A65-81358
APPLICATIONS OF TELEMETRY TO MEASUREMENT OF BLOOD FLOW AND PRESSURE IN UNRESTRAINED ANIMALS.
D. Franklin (Scripps Clin. and Res. Found., Scripps Inst. of Oceanog., La Jolla, Calif.), R. L. Van Citters, and N. W. Watson (Wash., U., Reg. Primate Res. Center, Seattle).
IN: PROC. OF THE 1965 NATL. TELEMETERING CONF., HOUSTON, TEX., APR. 1965.
New York, Lewis Winner, Apr. 1965, p 233-234. 5 refs.
Grants NIH HE-08337, HE-08433, and GM-10521.

A system is described for telemetering data from free-roaming baboons and dogs. Blood flow and arterial pressure are measured. The system utilizes an ultrasonic Doppler-shift blood flowmeter, a miniature silicon bridge pressure gage and standard FM/FM telemetry techniques. The animals tolerated the implanted transducers without trouble, and the system appeared suitable in range and reliability. The design of the system is described and circuit drawings are shown.

A65-81359
CHANGES IN GUESSING HABITS AS A FUNCTION OF SUBLIMINAL STIMULATION.
A. G. Worthington and N. F. Dixon (U. Coll., Dept. of Psychol., London, Great Britain).
Acta Psychologica, vol. 22, Apr. 1965, p. 338-347. 16 refs.

In an investigation of discrimination without awareness a measure was taken of the effect of a subliminal visual stimulus upon number guessing habits. The findings suggest that below the awareness threshold there is a significant tendency for the subject to give responses that are meaningfully related to the stimulus. This finding is inconsistent with those from a recent investigation.

A65-81360
STUDIES ON SUBJECTIVE DURATION. I. DIFFERENTIAL SENSITIVITY IN THE PERCEPTION OF REPEATED TEMPORAL INTERVALS.
J. A. Michon (Inst. for Perception RVO-TNO, Soesterberg, The Netherlands).
Acta Psychologica, vol. 22, Apr. 1965, p. 441-450. 14 refs.

The differential sensitivity for series of time intervals in the range from 67 to 2700 msec. was measured with the method of comparison and revealed a curve with two maxima of sensitivity: (a) at an interval of about 110 msec., with a Weber fraction Δ t/t of about 0.01, and (b) at an interval of about 600 msec., with a Weber fraction Δ t/t of about 0.02. The results bring together data from the classical time psychology and studies on "intermittent" stimulation. In the latter type of work for some reason no attention seems to have been paid to the maximum at 600 msec. although it is found to be present in most of the studies. This fact is discussed.

A65-81361
CIRCULATORY AND VENTILATORY RESPONSES TO POSTPRANDIAL EXERCISE.
W. B. Jones, H. D. Thomas, and T. J. Reeves (Ala., Med. Coll., Dept of Med., Birmingham; and Veterans Admin. Hosp., Med. Serv., Birmingham, Ala.).
American Heart Journal, vol. 69, May 1965, p. 668-676. 22 refs.
Ala. Heart Assoc. supported research.
Grant NIH 5RO1 HE 05080.

The circulatory and ventilatory responses to postprandial exercise were studied in normal men and compared with the fasting responses. The findings were as follows: (1) Exercising cardiac output was not affected by the meal. (2) The heart rate was faster during postprandial exercise. (3) The duration of systolic ejection was decreased out of proportion to the faster rate after the meal. (4) No significant change in arterial pO_2, pH, or O_2 uptake was found in postprandial exercise. (5) The lactate-pyruvate ratio was significantly increased during exercise after a meal. It is concluded that the changes found can be best explained by a postprandial decrease in effective blood volume, an increase in myocardial inotropic state, and an alteration in the distribution of cardiac output.

A65-81362
THE AMMONIA-GLUTAMIC ACID-GLUTAMINE SYSTEM OF THE BRAIN IN THE COMBINED EFFECT OF HYPOTHERMIA AND ELEVATED OXYGEN TENSION.
E. Z. Emirbekov.
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, May 1964, p. 42-45).
Bulletin of Experimental Biology and Medicine, vol. 57, May 1964, p. 563-566. 16 refs. Translation.

A study was made of the ammonia-glutamic acid-brain glutamine system in combined action of hypothermia (body temperature 20-19° C) and hyperoxia (4 atmospheres) in white rats. The system studied showed no significant differences from that in animals in the state of hypothermia: the ammonia content was 3.22 and 3.16 mg percent, glutamine 6.37 to 6.27 mg percent, glutamic acid 150 to 156 mg percent, respectively. There were no characteristic oxygen convulsions in hypothermic animals. Investigation of combined action of hypothermia and hyperoxia demonstrated that ammonia was not the cause of various functional states of the brain, but the result of chemical processes in the dicarboxylic acid-brain protein system.

A65-81363
EFFECT OF ENVIRONMENT ON THE PHYSIOLOGICAL REACTIONS DURING A REPEATED WORK TASK [EFFET DE L'ENVIRONNEMENT SUR LES RÉACTIONS PHYSIOLOGIQUES AU COURS D'UN TRAVAIL RÉPÉTÉ].
Lucien Brouha (E. I. du Pont de Nemours and Co., Haskell Lab., Wilmington, Del.)
Travail Humain, vol. 28, Jan.-Jun. 1965, p. 5-16. 9 refs. In French.

Subjects between 20-23 years of age walked on an assembly line at 5.2 kilometers/hour under two environments: 32° C and 42° C. After a 20 minute rest in the environment studied, the subjects walked for 25 minutes, then rested for 10 minutes. This cycle was repeated four times during each experience. In another experiment under the same walking conditions, the subjects walked for 15 minutes followed by 20 minutes of rest and the effect of eight environmental temperatures varying between 21° C and 49° C studied. The results indicated that for a given work load, while oxygen consumption remains practically the same, the heart rate increases progressively with the severity of the environmental temperature and the repetition of work-rest cycles. Since total cardiac cost and recovery cost were linearly related, the latter expression may be used as a measure of cardiac strain when continuous heart rate records during work cannot be obtained. The three recovery pulse method, P_1,P_2,P_3, provides a reliable measure of cardiac effort and permits simultaneous evaluation of cardiac return to normal. Included are representative tables and graphs of cardiac oxygen consumption, rhythm and cost, and pulmonary ventilation under the conditions studied.

A65-81364
BIOMECHANICAL STUDY OF MAN EXPOSED TO LOW FREQUENCY VIBRATIONS [ÉTUDE BIOMÉCANIQUE DE L'HOMME SOUMIS A DES VIBRATIONS DE BASSES FRÉQUENCES].
A. Wisner, A. Donnadieu, and A. Berthoz (Centre Natl. de la Rech. Sci., Lab. de Physiol. du Travail, Paris; and Régie Natl. des Usines Renault, Lab. de Physiol. et de Biomécan., Paris, France).
Travail Humain, vol. 28, Jan.-Jun. 1965, p. 17-56. 55 refs. In French.

A description is given of the results obtained by recording the sensations of subjects undergoing vibrations of a moderate intensity on a vibrating table. Known clinical syndromes (vertebral, gastrointestinal, urinary) were related to the disorders shown by human and animal subjects undergoing violent experimental vibration. These observations may be explained by mechanical considerations. Biomechanical studies revealed that the movements of large body segments, pelvis, thorax, and table, are similar to those of a model. The latter may be used to show the constancy of answers obtained during experimentation and that the subjects' individual characteristics have a negligible influence upon the results. Accelerations observed at different body levels varied if the sitting subject had a more or less stiff attitude. This led to a description of the body as a system of suspended masses. A clear relationship was found between the subject's excitation intensity and the type of seat comfort. It is proposed that a technique be established for the dynamic evaluation of seats, along with a method to calculate vehicle suspensions.

A65-81366
AVIATION PSYCHOLOGY: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION (PSYCHOLOGICAL STUDIES NO. 5).
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, 125 p.

This is a selection of twelve papers from the proceedings of the 3rd and 4th Meetings of the Western European Association for Aviation Psychology, held in London, 1959, and Copenhagen, 1961, respectively. Topics covered are: I. Accident liability and accident prevention; II. Training and assessment of training-achievement; III. Selection method; and IV. Miscellaneous. All papers are abstracted separately.

A65-81367
ASSESSMENT OF FLYING SKILL.
A. Cassie (Air Min., London, Great Britain).
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, p. 50-55.

A reliability study was conducted on the assessment of flying skill. Pilot studies having the instructors assess actual flight performance proved to be unsatisfactory due to the lack of consistency on the part of students and in assessment. Finally, the instructors rated flights of differing quality on film, employing one of three forms of assessment: (1) percentage grading of each turn (global), (2) rating of component parts on a 5 point quality scale, and (3) rating of component parts on a 3 point quality scale. From this evolved a specification for a flight test with an acceptable level of reliability: (1) It should lay down a definite sequence of exercises to be flown and if possible these exercises should each be flown more than once. (2) Each exercise should be broken down into components which can be separately assessed. (3) The scale of assessment should be long enough to allow assessors to discriminate adequately between various levels of ability. (4) All examiners should be fully briefed as to what to look for in each exercise and should be provided and be thoroughly conversant with the criteria against which each aspect of each exercise is to be marked.

A65-81368
AVIATION PSYCHOLOGY IN THE FRENCH AIR FORCE.
A. R. Missenard, R. Gelly, and E. Cadour (Centre d'Enseignements et de Rech. de Méd. Aéron., Paris, France).
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th, Copenhagen, 1961, Proc.).
The Hague, Mouton and Co., 1964, p. 83-90. 6 refs.

Aviation psychology in the French Air Force is concentrated in: (1) A number of medical examination centers for flying personnel (supervision and treatment of flying personnel, psychological training of Air Force doctors, and psychiatric selection of flying personnel); (2) The Aviation Medicine Teaching and Research Center (CERMA) which is concerned with fundamental research on human behavior under flight conditions and applied research on adaptation of machine to man; and (3) The Psychology Study and Instruction Center of the Air Force (CEIPAA), which seeks to improve selection and classification methods and, more recently, has been concentrating on the study of social psychological factors and statistical analysis.

A65-81369
AN EXPERIMENT IN PSYCHIATRIC SELECTION OF FLYING PERSONNEL.
A. R. Missenard, R. Gelly, M. Duffaut, and G. Llagre (Centre d'Enseignements et de Rech. de Méd. Aéron., Paris, France).
IN: AVIATION PSYCHOL.: STUDIES ON ACCIDENT LIABILITY PROFICIENCY CRITERIA AND PERSONNEL SELECTION.
Edited by A. Cassie, S. D. Fokkema, and J. B. Parry.
(Meetings of Western European Assoc. for Aviation Psychol., 3rd, London, 1959 and 4th Copenhagen, 1961, Proc.)
The Hague, Mouton and Co., 1964, p. 91-100. 99 refs.

This experiment is psychiatric selection of flying personnel was aimed at the perfection of a selection technique through semigroup tests for detection of individuals requiring a detailed clinical examination. At this stage the technique has not been perfected. The difficulties encountered included preselection of candidates, the discrepancy between test results and the clinical examination, the influence of motivation on test replies, and the reliability and validity of clinical examination results. The value of "success in school" as a criterion is discussed. Some educational recommendations are outlined. A more clinical approach is recommended to the selection of flying personnel.

A65-81370
AVIATION MEDICINE.
M. S. White (FAA, Washington, D. C.)
FAA Aviation News, vol. 4, May 1965, p. 12-13.

Pilots of private and commercial planes are required to undergo physical examination at definite periods of time. Among the causes for disqualifications are chronic alcoholism, drug addiction, epilepsy, history of psychotic disorders, disturbances of consciousness without satisfactory medical explanation, history of heart attack, diagnosis of angina pectoris or other evidence of coronary heart diseases, and diabetes requiring hypoglycemic medication. The Federal Air Surgeon has the authority to examine applicants for and holders of medical certificates for compliance with applicable medical standards, and issue, renew, or deny medical certificates to applicants and holders based upon compliance or noncompliance with applicable medical standards. The guidance material for formulating such standards is received from various sources, which can recommend criteria of medical fitness for flying. A continuing review of all medical standards are maintained with particular stress on: (1) distant visual acuity; (2) contact lenses; (3) glaucoma; and (4) special standards for air traffic control personnel.

A65-81371
CLINICAL SYNDROMES UNDER EFFECTS OF DIFFERENT RADIOFREQUENCY BANDS [KLINICHESKIE SINDROMY PRI VOZDEISTVII RAZLICHNYKH DIAPAZONOV RADIOCHASTOT].
E. A. Drogichina and M. N. Sadchikova (USSR, Acad. of Med. Sci., Inst. of Hyg. Labor, and Profess. Diseases, Moscow).
Gigiena Truda i Professional'nye Zabolevniia, no. 1, Jan. 1965, p. 17-21. In Russian.

Data collected over a period of many years showed that workers exposed to electromagnetic radiation of various frequencies— primarily the superhigh frequencies— for a long period of time suffer asthemia of various centers of the higher nervous system. The pathological process takes a slow course often without any specific manifestations. Very characteristic, however, are the disturbances of the autonomic system (the vagal region in particular), the intensity of which is in direct correlation with the intensity of radiation. Light exposure causes a disturbance of the autonomic nervous system and an asthenic syndrome; moderate exposure leads to development of an astheno-autonomic syndrome; and heavy exposure causes angiodystonic and diencephalic syndromes. In early stages the functional disturbances of the nervous system are not very pronounced and reversible. In later stages the effect is manifested by cardiovascular disturbances, which become persistent, with a steady development of the angiodystonic diencephalic syndromes.

A65-81372
QUANTITATIVE CHANGES OCCURRING IN THE SEBIAGOGIC FUNCTION OF THE SEBACEOUS GLANDS UNDER THE INFLUENCE OF ACETONE, GASOLINE AND OF WHITE SPIRIT IN INDUSTRIAL WORKERS [KOLICHESTVENNYE IZMENENIIA SALOVYDELITEL'NOI FUNKTSII SAL'NYKH ZHELEZ POD VLIIANIEM ATSETONA, BENZINA I UAITSPIRITA U RABOCHIKH NA PROIZVODSTVE].
V. I. Rogailin (USSR, Acad. of Med. Sci., Inst. of Hyg. Labor, and Profess. Diseases, Moscow).
Gigiena Truda i Professional'nye Zabolevaniia, no. 1, Jan 1965, p. 27-30. 14 refs. In Russian.

A study of sebacious gland function by quantitative analysis of the skin fat taken from the surface of the skin demonstrated that in adult healthy individuals there is a definite amount of skin fat which is secreted to the dorsal side of the hands, averaging 1100 to 1160 micrograms on a surface of 16 cm^2 in the persons examined, with but a slight difference in men and women. An examination of 75 workers exposed to contacts with organic

solvents in an industrial environment revealed depressed function of sebacious glands and a drop of the initial amount of skin fat found on the surface of the hands to the following figures: with acetone—250 micrograms; with gasoline—420 micrograms; and with pure alcohol—814 micrograms over an area of 16 cm^2. Therefore it is necessary to apply fat creams and pastes to the skin of the hands after handling of solvents. The composition of these creams and pastes should closely correspond to the biochemical constants of the skin and, especially to the physiological composition of the skin fat.

A65-81373
DYNAMIC SIMULATION OF THE A4D FLASH BLINDNESS PROTECTIVE SYSTEM.
Gloria T. Chisum and J. H. Hill (U.S. Naval Air Develop. Center, Aviation Med. Acceleration Lab., Johnsville, Pa.).
Aerospace Medicine, vol. 36, Jun. 1965, p. 533–537.

Operation of the A4D thermal protective system consisting of a buggy-top thermal enclosure and ELF goggles was evaluated under acceleration stresses of 1.2 to 5 g. Five experienced pilots and three non-pilot subjects operated the system within empirically predetermined limits of safety. All subjects were within the 5th to 95th percentile size range of Navy pilots. Subjects in the lower third of the size range exhibited greater facility in operation of the system than those in the upper two-thirds of the size range. It is concluded that under the conditions described in this paper pilots of A4D aircraft will be able to use the thermal shield–ELF flash blindness protective system and maintain safe operation of the aircraft.

A65-81374
CLINICAL ASPECTS OF AEROSPACE NURSING.
Ellen M. Respini (School of Aerospace Med., Flight Nursing Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 36, Jun. 1965, p. 545–548. 19 refs.

This study presents a critical evaluation of the place of the nursing profession in relation to the current state of aerospace medical invesitgation. It is determined that clinical aerospace nursing can be categorized into four general areas of endeavor: (1) preventive and occupational health nursing, (2) adaptation to the numerous elements of by-products from aerospace investigation (usually termed "fall-out"), (3) care of the person of the astronaut before and after flight, and (4) anticipation of nursing problems to be encountered in the 0-g atmosphere of the space cabin. In order to attain proficiency in the four broad areas cited, the nurse must be knowledgeable, if not proficient, in many disciplines such as physics, electronics, engineering and mathematics. She must find her way into the research laboratory and become a part of the team doing the experimentation that is to determine man's ultimate capability in space. In sum, she must acquire a creative, investigative attitude and the educational background to support that attitude.

A65-81375
DEVELOPMENT OF A TRITIUM SELF-LUMINOUS LIFE RAFT LIGHT SOURCE.
Ernest B. McFadden, J. D. Garner, and R. A. Masler (FAA, Civil Aeromed. Res. Inst., Oklahoma City, Okla.).
Aerospace Medicine, vol. 36, Jun. 1965, p. 548–551.

A self-luminous light source utilizing tritium gas, a radioactive isotope of hydrogen, and a zinc sulfide phosphor is described. The sources are primarily designed to provide survivors emerging from the ditched aricraft, or already in the water, with a visible identification of the location and attitude of the life raft and boarding stations. Two sizes of tritium light sources were designed and tested. Eight three-inch sources of 425 microlamberts each of brightness were fabricated for use on the periphery of a 25-man life raft. Two six-inch sources of 225 microlamberts each were fabricated for use at the boarding station. Special geometry of the sources allows visibility angles in excess of 180°. Emission of visible light is continuous and not dependent upon an external source of energy. Reduction in brightness is a function of the half-life of tritium (12.6 years). The use of self-luminous safety devices utilizing tritium is approved by the Atomic Energy Commission and presents no radiation hazard to crew or passengers.

A65-81376
MULTIPLE CUTANEOUS STIMULATION: THE DISCRIMINATION OF VIBRATORY PATTERNS.
Frank A. Geldard and Carl E. Sherrick (Princeton U., N. J.).
Journal of Acoustical Society of America, vol. 37, May 1965, p. 797–801.
NSF and NIH supported research.

In an effort to supply widespread cutaneous stimulation and thus make possible systematic study of the limits of spatial discrimination through this channel, there has been devised a multiple contactor system permitting application of vibratory signals to 10 bodily loci simultaneously. Patterns comprising from 1 to 9 stimuli were presented in successive pairs, the subject's task being to report whether the patterns were perceived as "same" or "different." Members of pairs were separated by 500 msec. and burst duration was 200 msec. Two synchronized Western Union tape transmitters presented 20 programs of 50 pairs of patterns, 500 "same" and 500 "different" pairs being randomly intermixed in the 1000 presentations. A pilot experiment, in which many types of pattern changes were explored, revealed errors to be associated with (a) relative pattern complexity (large numbers of vibrators) and (b) high degree of communality (many elements in common). A formal experiment, involving a stratified sample with all combinations of numbers of loci and degrees of communality represented equally, verified the preliminary finding, and permitted, in addition, separation of the two factors apparently responsible. The relation between errors and communality, with number of stimulus positions held constant, proves to be an intimate one; confusions between patterns arise when there is relatively large overlap of elements in the patterns to be discriminated. A supplementary analysis directed at whether particular receptive areas may be especially prone to error shows no single locus, of the 10 employed, contributing to error production more than would be dictated by chance.

A65-81377
LOCALIZATION AFTEREFFECTS WITH PULSE-TONE AND PULSE-PULSE STIMULI.
W. R. Thurlow, Anita E. Marten, and Bhalchandra J. Bhatt (Wis., U., Madison).
Journal of the Acoustical Society of America, vol. 37, May 1965, p. 837–842. 12 refs.
NSF supported research.

When a pulse is presented from one position in space near in time to the beginning of a tone burst coming from another position in space, the tone burst may be perceived to be displaced toward the pulse. Measurements of displacement effects are given for various angles of separation of sources and duration of tone. A related type of displacement effect occurs that involves the perceived displacement of one pulse toward another in space when the two pulses are presented with small time separation between them. Another type of effect has been discovered, more closely related to von Békésy's concept of funneling, in which a pulse appears to be funneled into the spatial location of another that precedes or follows it by a small time interval. A "place" model is presented to help to explain these effects.

A65-81378
EFFECT OF ULTRASOUND ON FIBRINOGEN IN HUMAN PLASMA.
Ronald L. Searcy, Lois M. Bergquist, Norval M. Simms, Donald Johnston, and James A. Foreman (Calif. Coll. of Med., Depts of Pathol., Los Angeles; and Los Angeles County Gen. Hosp., Calif.)
Nature, vol. 206, May 22, 1965, p. 795–796. 7 refs.

High-frequency sound is capable of altering the precipitability of human fibrinogen at 56° C and also the reactivity of this plasma protein with thrombin or staphylocoagulase. Fibrinogen levels of plasmas exposed to short-term oscillation were not further reduced when stored at room temperature for a number of hours. Therefore, it appears unlikely that the fibrinogenolytic type of response to ultrasound was due to plasmin, unless this enzyme was active only during the actual disintegration process. Ultrasound could modify the molecular configuration of fibrinogen, thereby increasing its solubility at 56° C. Conversion of fibrinogen to fibrin, catalyzed by thrombin and possibly coagulase, involves the initial formation of monometric fibrin. These monomers afterwards undergo polymerization and form a clot. Conceivably, ultrasound could affect the fibrinogen molecule in a manner which precludes enzymatic production of fibrin monomers or the polymer.

A65-81379
MODIFICATIONS OF THE VESTIBULAR DC RESTING POTENTIALS BY STIMULATION OF THE EFFERENT VESTIBULAR SYSTEM.
O. Sala (Padova, U., Oto-, Rhino-, Laryngol. Clin., Italy).
Experientia, vol. 21, May 15, 1965, p. 282–283. 7 refs.

The efferent influence on vestibular DC resting potentials (DC RP) of adult cats was investigated. The cats were tracheotomized and decerebrated precollicularly, sometimes also decerebellated. A labyrinth and the efferent vestibular system (EVS) were subjected to thermic (cold and warm water) and electric stimulation, respectively. Cold stimulation constantly causes a hyperpolarization of the contralateral labyrinth; warm stimulation causes a reverse effect (feedback loop between the two labyrinths). Electric stimulation of the EVS causes an increase (hyperpolarization) of the vestibular DC RP, after a latent time of 9-12 msec. With interruption of stimulation, the vestibular DC RP returned to normal, except in cases when a slight fall was observed. Electric stimulation of the EVS increases the hyperpolarization caused by cold stimulation and reduces the depolarization induced by warm stimulation. Intravenous administration of strychnine in subconvulsive doses reduces or abolishes the modifications induced on the vestibular DC RP by the stimulation of the EVS.

A65-81380
TRANSCALLOSAL, EXTRACALLOSAL, AND GENICULO-CORTICAL RESPONSES DURING PHYSIOLOGICAL SLEEP AND WAKEFULNESS.
F. Baldissera, M. G. Cesa-Bianchi, and M. Mancia (Consiglio Nazl. delle Ric., Lab. of Electrophysiol., Milan; and Milan, U., Inst. of Human Physiol., Italy).
Experientia, vol. 21, May 15, 1965, p. 291–292. 7 refs.

Analyses were made of transcallosal (TCR), extracallosal (ECR), and visual cortex (VCR) responses and their interaction during the natural phases of

sleep and wakefulness. Experiments were made on cats, unrestrained, with chronic bipolar stimulating electrodes implanted in the lateral geniculate body of one side and in the white matter underneath the lateral gyrus of the opposite hemisphere. Electroencephalograms (from frontal areas) and electromyograms (from nuchal muscles) gave information on the degree of wakefulness and stage of sleep of the animal during the experiment. The results suggest: (a) the excitability of cortical neurons activated by the transcallosal volley is higher during sleep (either slow or paradoxical) than during wakefulness; (b) the ECR was very similar during both wakefulness and paradoxical sleep; (c) the transition from light to deep sleep was characterized by an augmentation of VCR indicating an increase of thalamic excitability as already reported by others; and (d) interaction experiments indicate that only during synchronized sleep can a long-lasting inhibition of geniculo-cortical pathway by transcallosal volley occur. The inhibition appears to be very short during the most active wakefulness and the deepest stage of sleep.

A65-81381
EXCITABILITY CHANGES DURING PARADOXICAL SLEEP IN THE RAT.
T. Weiss and W. R. Adey (Calif., U., Brain Res. Inst., Los Angeles).
Experientia, vol. 21, 1965, p. 292-293.
Contract AF-AFOSR 246-63; and Grant PHS NB-01883.

Bipolar electrodes were implanted in the frontal cortex, dorsal hippocampus, mesencephalic reticular formation, and in some cases, in the caudate nucleus and nonspecific thalamic region in 11 rats. More than 100 sleep cycles were analyzed. It was found that after the beginning of the regular θ-activity (4-7/sec) in the hippocampus, which is a very typical electroencephalographic (EEG) manifestation of paradoxical sleep, the cortical EEG usually exhibited well developed spindle activity (9-14/sec). The amount of spindling gradually decreased and almost disappeared by the end of the first minute of paradoxical sleep. This spontaneous spindling was present also in cases where cortical spindles did not occur frequently in the slow wave sleep phase (SWSP). In these cases a gradual increase in the amount of cortical spindles was observed during the last minute of SWSP. Often a few cortical spindles were observed during the last seconds of paradoxical sleep before the behavioral arousal reaction (and hippocampal desynchronization in the EEG) following paradoxical sleep. Dynamic changes observed in the EEG show that paradoxical sleep is probably not a homogeneous phenomenon characterized by a stable level of function in the participating brain systems.

A65-81382
AIRCRAFT ACCIDENT PATHOLOGY: A STUDY IN COOPERATION.
J. K. Mason (Armed Forces Inst. of Pathol., Bethesda, Md.)
(Assoc. of Mil. Surg. of the U. S., 71st Ann. Meeting, Washington, D. C., Oct. 20-22, 1964).
Military Medicine, vol. 130, Jun 1965, p. 578-585. 14 refs.

The pathologist's contribution to aircraft accident investigations is very valuable but it is only within the framework of a cooperative effort that his value is maximal. Relationships (especially those with police, coroner, engineers, flight safety workers, deceased's physicians, physiologists and other medical colleagues, research laboratory and records department, and international bodies) into which the pathologist must enter are described. In general, the standing of pathologists in accident work will be high only if they orient their efforts to the saving of future lives rather than to a simple matter of establishing a cause of death. If this is done, lay investigators will inevitably regard the pathologist as an equal and valued colleague with whom there is complete sharing of views. The increasing acceptance of these ideas by medical and lay persons alike has contributed significantly to the modern efficiency of aircraft and other transportation accident investigation.

A65-81383
THE EFFECT OF CATECHOLAMINES AND COLD EXPOSURE ON THE LIPOLYTIC ACTIVITY OF RAT HEART.
D. Grafnetter, J. Grafnetterova, E. Grossi, and P. Morganti (Milan, U., Inst. of Pharmacol., Italy).
Medicina et Pharmacologia Experimentalis, vol. 12, 1965, p. 266-273. 13 refs.

Norepinephrine or epinephrine (100-200 μ g. per rat) had no profound influence on rat heart clearing factor lipase activity in the acute experiment: the trend toward an increased activity is not satistically significant. An important increase of heart clearing factor lipase activity, however, is found in rats exposed for 3 or 12 hours to cold environment (4°C.) This increase was paralleled in the 3-hour, but not in the 12-hour period, by an increased level of free fatty acids in serum. Our data suggest that the physiological adaptation of the heart clearing factor lipase activity is not, or only in minor part, induced through a release of norepinephrine or epinephrine.

A65-81384
CARDIAC REACTIONS TO ANOXIA IN THE COMMON CARP (CYPRINUS CARPIO L.) [REACTIONS CARDIAQUES A L'ANOXIE CHEZ LA CARPE COMMUNE (CYPRINUS CARPIO L.)].
A. Serfaty, R. Labat, and A. Bernat. (Fac. des Sci. de Toulouse, Lab. de Biol. Animale, France).
Revue Canadienne de Biologie, vol. 24, Mar. 1965, p. 1-5. 9 refs.
In French.

The following results were obtained in the Carp, a non oxyphilic fish: (1) the electrocardiographic responses to anoxia are similar to those observed in mammals placed in the same conditions; (2) there is a relation between the emphasis of the bradycardic responses and the level of oxygen in the environment; (3) an abrupt and severe anoxia results in cardiac responses similar to those obtained in the aero-cardiac reflex of the fish; and (4) in bilateral vagotomized fishes the bradycardic responses to a severe anoxia are slow. The same results were obtained in fish placed in less asphyxic environments. Thus, the emergence of the cephalic region of the fish or an abrupt and severe anoxia provokes some cardiac responses of vagal origin enhanced by the effects of anoxia on the cardiac tissue.

A65-81385
DEPENDENCE ON AGE OF RETENTION RATE OF INTRAVENOUSLY ADMINISTERED CALCIUM IN PLASMA [ALTERSABHANGIGKEIT DER VERWEILDAUER INTRAVENOS VERABREICHTEN CALCIUMS IM PLASMA].
W. Bauditz (Hamburg, U., I. Med. Universitätsklin., Hamburg-Eppendorf, West Germany).
Zeitschrift für die gesamte Experimentelle Medizin, vol. 139, 1965, p. 178-187. 22 refs. In German.

A longer stasis during the drawing of blood as well as centrifugation in unstoppered tubes cause a linear rise in calcium. The decrease in plasma calcium level after a single intravenous injection of 2.5 mg Ca per kg body weight was monitored in three age groups, six metabolically healthy patients in each. In the juvenile group (16 to 20 years) the descent of Ca level occurred within four hours. In the two older groups (23 to 50 years; 53 to 87 years) the rise of serum Ca sometimes persisted for more than 10 hours. In the oldest group the plasma Ca decreased faster than in the middle-aged a rebound mechanism. Control of urinary Ca levels for three days after intravenous administration showed no significant differences between the groups in Ca excretion, although the plasma Ca levels fell at different rates.

A65-81386
CULTIVATION OF GREEN PLANKTONIC ALGAE ON SEWAGE.
G. G. Vinberg (Belorussian Sci. Res. Inst. of Sanit. Hyg., Minsk, USSR).
(Mikrobiologiia, vol. 33, May-Jun. 1964, p. 508-515).
Microbiology, vol. 33, May-Jun. 1964, p. 456-461. 8 refs. Translation.

When protococcal algae are introduced into unpurified town sewage, their rapid growth commences during the initial anaerobic self-purification phase, the duration of which is considerably reduced due to photosynthetic aeration stimulating bacterial oxidative mineralization of dissolved and suspended organic substances. Algal growth is accompanied by a decrease of alkalinity, ammonia nitrogen, and mineral phosphorus. The initial mineral forms of biogenous elements are soon exhausted, the algal growth being due to a considerable extent to CO_2 and biogenous elements previously forming a part of the sewage organic substances and released upon their bacterial mineralization. Algal growth is limited mainly by the exhaustion of carbon contained in sewage. Thus aeration of the cultures by means of air bubbling results in a much higher algal yield. During cultivation in closed vessels at a temperature of 25° C and at an illumination of 3000 lux for 12 hr a day, the maximal yield of algae (Scenedesmus obliquus, Sc. quadricauda and Chlorella vulgaris) equaled ca. 186-340 mg/l at an average amount of ash-ee material of 268 mg/l on the 10th-12th day from the beginning of the experiment. The yield rose to 150-1000 mg/l and even to 1600 mg/l from the 8th to the 16th day of cultivation) in the cultures through which air was bubbled for 12 hr a day, other conditions (temperature and illumination) being the same.

A65-81387
THE TISSUE DOSE OF COSMIC RADIATION RECEIVED BY V. F. BYKOVSKII AND V. V. NIKOLAEVA-TERESHKOVA DURING THEIR COMBINED ORBITAL FLIGHT.
I. A. Bochvar, A. A. Vasil'eva, I. B. Keirim-Markus, T. I. Prosina, N. A. Sergeeva, and L. N. Uspenskii.
(Kosmicheskie Issledovaniia, vol. 2, Mar.-Apr. 1964, p. 304-307).
Cosmic Research, vol. 2, Mar.-Apr. 1964, p. 256-257. 6 refs. Translation.

During the cosmic flights of Bykovskii and Tereshkova, the dose level near the skin of the cosmic ship was 2-3 times higher than in the center of the cabin. Evidently the soft secondary corpuscular radiation, with an energy of the order of 10 MeV on the nucleon, acts on the walls of the ship. In fact, the difference between the readings of the IKS dosimeters with filters of aluminum and tin was the same as in the center of the cabin, i.e., the contribution of the soft bremsstrahlung from the walls of the ship was small. Meanwhile the additional 1.7 mm of aluminum on the IKS dosimeters leads to a reduction of 1/2 to 2/3 in the absorbed dose. This shows that, at higher doses of cosmic radiation, knowledge of the distribution of the doses of radiation in the cabin of the apparatus and in the body of the cosmonaut may be of great importance in evaluating the radiation environment during flight.

A65-81388
THERMAL MANIKIN TO AID MSC.
Michael Getler.
Missiles and Rockets, vol. 16, May 17, 1965, p. 49, 52.

An instrumented fiberglass and aluminum thermal manikin designed to simulate an astronaut's thermoregulatory system and gather data on temperature effects in 17 regions of the body is being developed for NASA in order to relieve astronauts from time-consuming and sometimes dangerous spacesuit testing. Sized to represent a 50th percentile man, the manikin has separate heating elements installed on the inside of each of the seventeen sections to allow uniformed heating throughout each section. The individual heaters will make it possible to simulate the actual temperature variations present in a human being, as well as the regulatory processes of the human, which are made during adjustment to a change in environment. Spacesuit designers must take man's native thermoregulatory capabilities into account when designing protective clothing for astronauts. The heating elements in the manikin will simulate the metabolic rates of the astronaut, and platinum resistance thermometers attached to the manikin's skin will provide read-out of skin temperature measurements.

A65-81389
AF PILOTS TO SIMULATE APOLLO FLIGHT.
Heather M. David.
Missiles and Rockets, vol. 16, May 31, 1965, p. 84–85.

Preliminary training of three Air Force Aerospace Research School pilots is under way in preparation for a simulated seven-day Apollo lunar-landing mission designed to get data on exact limits of pilot performance. The results will provide NASA with a data bank on which to base estimates of pilot reliability for Apollo and future mission decisions. For study purposes the pilots are assumed to be the primary mode of control rather than backup, in contrast with plans for the actual Apollo mission. Realistic flight conditions will be kept throughout the seven-day "trip" within a full-scale mockup of the Apollo Command Module and Lunar Excursion Module. Heavy emphasis will be placed upon physical conditioning of men through isometric exercises using a bar and chain with a calibrated pull rate. The exercise will be performed six times each day, for a total of 30 minutes in 24 hours. The Air Force will join in providing biomedical support for the experiment and will test its new liquid space diet.

A65-81390
YOUR PLACE IN AMERICA'S SPACE PROGRAM.
Henry B. Lent.
New York, The Macmillan Co., 1964, xii + 209 p.
$4.50.

This book is a popular summation of the career opportunities in all aspects of the space industry from astronaut to astroscientist. The main purpose is to acquaint America's youth with the Space Program. An appendix gives a listing of fields in astronautics, names of commercial companies working in the space field, and listing of universities offering courses in related subject areas.

A65-81391
CONSIDERATION FOR ENVIRONMENTAL RESEARCH IN HUMAN FACTORS.
Frederick H. Rohles (Kan. State U., Inst. for Environ. Res., Manhattan).
Journal of Environmental Sciences, vol. 8, Jun. 1965, p. 18–19.

The number of variables which may influence the outcome of studies of the responses of living organisms to different environmental conditions is very large. In fact, there are often so many that the results are held suspect because these factors are either uncontrolled or completely ignored. There are three types of variables to be considered: organismic, reciprocative, and physical. These encompass all aspects of environmental research. The organismic factors are: sex, age, diet, cicadian rhythm, and basal metabolic rate. Of many variables which constitute the physical environment, the most common are temperature and relative humidity. But these must be considered in light of air movement, as well as the composition of the inspired gas and the atmospheric pressure. In a space environment the number of variables is even greater because the dynamic forces acting on the organism before, during, and after space flight must be included. Among these are: acceleration, weightlessness, impact, vibration, radiation, light, and sound. The reciprocative variables which interact directly with the organism and the environmental variables are: activity, clothing, exposure time, and social factors.

A65-81392
LUNAR SURFACE AND FREE SPACE HAZARDS RELATING TO SPACE SUIT DESIGN.
Jerry Goodman and Matthew I. Radnofsky (NASA Manned Spacecraft Center, Houston, Tex.)
Journal of Environmental Sciences, vol. 8, Jun. 1965, p. 26–31.

The Apollo Extravehicular Mobility Unit (EMU) will provide the sole means of protection from lunar environmental conditions for the extravehicular astronaut on the lunar surface. The EMU will provide protection by encapsulating the astronaut in an anthropomorphous pressure vessel, termed the Pressure Garment Assembly (PGA), which will be pressurized with oxygen to 3.7 psia. The Portable Life Support System (PLSS) carried on the astronaut's back will contain the oxygen supply and will provide the following: PGA pressurization and oxygen circulation, CO_2 removal, liquid and oxygen temperature control, telemetry of critical medical parameters, suit pressure and high oxygen flow sensing, and extravehicular communications. A redundant emergency oxygen supply, separate from the PLSS, will also be available for astronaut use, should the need for a separate supply occur. The inner liquid-cooled garment, with the water source in the PLSS, will regulate body temperature. A "Jacob's staff" will be used by the astronaut to provide stability during walking. An overall thermal-meteoroid garment will be provided as an added protection. The EMU will afford the astronaut life support and environmental protection.

A65-81393
CRITERIA FOR ASSESSING RISK OF HEARING DAMAGE.
John L. Fletcher (U. S. Army Med. Res. Lab., Psychol. Div., Fort Knox, Ky.).
(Symp. on Noise Effects and Hearing Conserv. in Ind., Virginia, Minn., Jun. 4–5, 1964).
Symp. sponsored by East Range Clin.
Journal of Occupational Medicine, vol. 7, Jun. 1965, p. 281–283.

The basic underlying foundation of any hearing conservation program is the damage risk criteria (DRC) used with the program. DRC provides reference or guide lines to exposure which could result in permanent damage to hearing. The DRC are considered to provide maximum protection against losses in the speech region. Most compensation regulations require 15 dB or more of loss for frequencies of 500, 1000, 2000, 3000 cps or some combination of such frequencies. One regulation prescribes 1 1/2% compensation for each decibel of loss above 15 dB, with 100% disability awarded for a loss above about 82 dB. The author discusses the DRC applied to the U.S. Air Force hearing conservation program as outlined in Air Force Regulation 160-3. These DRC are based on exposure to broadband noise, specifically to the sound pressure level with certain sorting octaves of broadband noise, not to an over-all sound pressure level, which discloses another assumption of exposure to broadband noise. In addition, consideration of hazards of impulse noise should be included. However, there is a lack of research data in this area. The criteria presented are not very recent, but have been found efficient in preventing hearing loss among workers operating under them.

A65-81394
RADIATION IN THE REALM OF LIFE. [DAS STRAHLUNGSFELD IM LEBENSRAUM].
Inge Dirmhirn.
Frankfurt am Main, Akademische Verlagsgesellschaft, 1964, viii + 426 p.

Radiation processes and their influence on life are reviewed, primarily natural electromagnetic radiation of a wave length of 0.3 to 100. The chapters are organized along the following lines: (1) basic data on the effect of radiation on life processes, (2) natural electromagnetic radiation fields, (3) modification of radiation fields imposed by life, (4) life within the electromagnetic field, and (5) methods of measurement. Mathematical formulation is deemphasized in order to make the material available to a wide selection of disciplines, e. g., botanists, zoologists, physicians, hygienists, construction engineers, etc.

A65-81395
THE EVOLUTION OF MENTAL CAPACITY AS A FUNCTION OF AGE (17 TO 40 YEARS): A STUDY PERTAINING TO GROUPS OF PROFESSIONAL WORKERS [L'EVOLUTION DES CAPACITES MENTALES EN FONCTION DE L'AGE (17 A 40 ANS) ETUDE PORTANT SUR DES GROUPES D'OUVRIERS PROFESSIONNELS].
R. Bonnardel (Ecole Prat. des Hautes Etudes, Lab. de Psychol. Appl., Paris, France).
Travail Humain, vol. 28, Jan.–Jun. 1965, p. 91–105. 21 refs. In French.

A quick survey of research studies on the evolution with age of human abilities shows the importance of working on homogeneous groups, specially as far as school training and professional level are concerned. This study bears on the evolution with age of mental abilities of groups of subjects engaged in a given job: they are skilled workers in metallurgy, all having received the same school training. Comparisons were made between three groups: young skilled workers (17 to 18 years old) examined after a few months in workshops following their graduation from an industrial training school (Group I = 1000 cases), skilled workers examined when engaged (Group II = 1750 cases, 20 to 30 years old; Group III = 200 cases, 30 to 40 years old). Thirty-one tests of a standard examination were used. Comparisons were made through a differentiation index 19 for each of the tests and for groups of tests corresponding to the usual headings of the standard examination. For the different headings, the maximum is reached: by the youngest group (17 to 18 years old) for P.I. (intellectual potential) and CA. (computing), by the group 20 to 30 years old for D. (manual dexterity); by the group 30 to 40 years old for OR. (spelling). The maximum lies between the ages 17 to 30 for the headings C.P.M. (perpetual and mental speed) and I.P. (practical, concrete intelligence); between the groups 20 to 30 and 30 to 40 years old for the headings V. (verbal). Detailed results for the different tests are discussed and the importance of the overlapping between the 3 groups is stressed.

A65-81396
KEROSENE AND HUNGER [LE KEROSENE ET LA FAIM].
Pierre Paquier.
Forces Aeriennes Francaises, vol. 19, Jun. 1965, p. 887–906. In French.

The fermentation of micro-organisms on kerosene results in a synthetic food which consists of concentrated proteins and vitamins and can be reduced to a black powder. This powder may be incorporated into foods without changing their taste and without odor. It may also be used as a source of nourishment by adults while repairing worn cellular tissues and by undernourished children as a food supplement. Synthetic food of this type produced on kerosene provide man with a means to subsist on a minimal diet. Discussion is included on hunger and man, properties of microorganisms and kerosene, methods of fermentation of microorganisms on kerosene, and the nutritive properties of microorganisms cultured on kerosene.

A65-81397
OZONE TOXICOLOGY: A REVIEW OF RESEARCH AND INDUSTRIAL EXPERIENCE: 1954-1964.
H. E. Stokinger (U. S. Dept. of Health, Educ. and Welfare, PHS, Div. of Occupational Health, Washington, D. C.)
Archives of Environmental Health, vol. 10, May 1965, p. 719-731. 68 refs.

The importance of ozone as an air pollutant has been well demonstrated. Ozone was found to be the main component in oxidant smog derived from hydrocarbons, sunlight, and nitrogen dioxide. The Air Force has established the presence of ozone in airplane cabins at altitudes of 30,000 feet. Ozone is generated in appreciable quantities around inert-gas shielded arc welding devices and high voltage electric equipment. Ozone is also used for air and water purification. The toxic effects of ozone have been well established. It decreases respiration, increases pulse, reduces body temperature and produces somnolence. Respiratory effects may result in pulmonary edema, hemorrhage, and death, if the concentration is sufficiently high. The extrapulmonary effect may be by direct depression of the nervous system from contact of ozone with nerve endings in the respiratory tract. Slowing of heart function is due to vagal action through stimulation of medullary centers resulting in an increased CO_2 content of blood. In man, ozone can affect vision. Biochemical effects are primarily due to protein denaturation.

A65-81398
A CLINICAL STUDY OF ACUTE MOUNTAIN SICKNESS.
William H. Hall, Eldon C. Metzger (U.S. Army Res. Inst. of Environ. Med., Natick, Mass.), Timothy G. Barila (Walter Reed Army Inst. of Res. Washington, D.C.), K. K. Gupta (Defence Inst. of Physiol., and Allied Sci., Delhi, India).
(Am. Med. Assoc., 113th Ann. Meeting, San Francisco, Jun. 21-25, 1964). Archives of Environmental Health, vol. 10, May 1965, p. 747-753. 30 refs.

Acute mountain sickness results from hypoxia, but the pathophysiology remains obscure. Some persons experience symptoms at 6,000 feet elevation; but virtua'ly all unacclimatized persons transported rapidly to 15,000 feet altitude or higher become affected. The cardinal manifestations are headache, breathlessness, and impaired capacity for exertion. The effect may be so severe that performance may be markedly impaired. There is rapid clinical improvement; but full recovery of work performance equal to that at sea level is achieved slowly. A dietary supplement providing 60mEq of potassium daily, which was started five days prior to transportation, produced no prophylactic effect. It was expected that respiratory alkalosis would occur as a consequence of hypoxia hyperventilation and resulting hypocapnia, and that supplementary potassium would facilitate compensatory renal bicarbonate excretion. Urinary pH findings were consistent with these predictions. This suggests significant metabolic acidosis as the result of hypoxic metabolism arising concomitantly with respiratory alkalosis.

A65-81399
WILEY POST: FIRST TEST OF HIGH ALTITUDE PRESSURE SUITS IN THE UNITED STATES.
Charles L. Wilson (Headquarters, AF Systems Command, Andrews AFB, Md.).
(Aerospace Med. Assoc., 34th Ann. Meeting, Los Angeles, May 1, 1963). Archives of Environmental Health, vol. 10, May 1965, p. 805-810. 12 refs.

Three different high altitude suits were designed and tested for Wiley Post. The report contains a photograph of each of these three suits. Two low pressure chamber tests were conducted using the final suit. These represent the first United States tests of a human subject in a high altitude pressure suit at low barometric pressures. Post employed his suit on at least ten and possibly 17 flights and used liquid oxygen on such such flights.

A65-81400
ELECTROCARDIOGRAM AND METABOLISM DURING MUSCULAR WORK. PART I. NORMAL SUBJECTS [ELETTROCARDIOGRAMMA E METABOLISMO DURANTE IL LAVORO MUSCOLARE. NOTA I. SOGGETTI NORMALI].
Angelo Cherchi, Gian Paolo Nissardi, and Mario Raffo (Cagliari, U., Ist. di Clin. Med. Gen. e Terapia Med. and Ist. di Med. del Lavoro, Italy).
Lavoro Umano, vol. 16, Dec. 1964, p. 729-744. 24 refs. In Italian.

Electrocardiographic (ECG) studies were made on six normal young men between 20-25 years, and six adults between 45-50 years of age during muscular work increasing progressively from 25 watts on the Lanooy hyperbolic cycloergometer under aerobic and anaerobic conditions. ECG changes were found to be entirely correlated with metabolic variations induced by work and especially with oxygen consumption changes. ECG studies in normal persons permit evaluation of the vast capacity of the heart to adjust to work and demonstrate that the ECG variations are within normal physiological limits. However some changes such as the excessive increase of cardiac frequency, the relative increase in the duration of the P-R interval, the significant increase of Q-T_C, and the reduction of the amplitude of the T wave in V_5 observed during maximum anaerobic work could be interpreted, on the basis of significant concomitant metabolic changes, as an expression of a state of myocardial hypoxia. In older subjects, changes caused by work were decisively less in relation to the low amount of work performed, whether aerobic or anaerobic, and with consequently less oxygen consumption.

A65-81401
DOSAGE OF CARBOXYHEMOGLOBIN IN CARBON MONOXIDE POISONING: CLINICAL CASE HISTORY [IL DOSAGGIO DELLA CARBOSSIEMOGLOBINA NELLA INTOSSICASIONE DA OSSIDO DI CARBONIO, CONTRIBUTO CLINICO CASISTICO].
R. Raddi, V. D'Angelo, and O. Marras (Florence, U., Ist. di Med. del Lavoro, Italy).
Lavoro Umano, vol. 16, Dec. 1964, p. 745-751. 10 refs. In Italian.

A comparative study is made of the methods used to diagnose carbon monoxide poisoning in 150 patients. Included are the methods of: Wintrobe (determination of erythrocyte hematocrit value); Belli et al (determination of hemoglobin iron content); Heilmeyer, Wolff (determination of carboxyhemoglobin); and Morelli (determination of extracted carbon monoxide). On the basis of extensive tabulated data for each method and patient, it is concluded that Wolff's method is the most suitable for use in the rapid detection of carbon monoxide poisoning from the standpoint of simplicity, execution, and accuracy of results.

A65-81402
PROLONGED MECHANICAL VENTILATION. I. FACTORS AFFECTING DELIVERED OXYGEN CONCENTRATIONS AND RELATIVE HUMIDITY.
Peter P. Bosomworth and Frank C. Spencer (Ky., U., Coll. of Med., Depts. of Anesthesiol. and Surg., Lexington).
American Surgeon, vol. 31, Jun. 1965, p. 377-381. 14 refs.

The oxygen concentration and relative humidity of gas delivered by five frequently used mechanical ventilators were measured and compared with values determined during air dilution and activation of water and medication nebulizers. Oxygen concentrations higher than anticipated were produced during activation of the air dilution venturi when oxygen was used as the power source for the nebulizer. One hundred per cent humidification of delivered gas at body temperature with the nebulizer oxygen flows utilized was usually not possible unless a heated nebulization system was used. Monitoring of delivered oxygen concentrations and relative humidity with the equipment utilized in this study may be useful in the management of long term mechanical ventilation employing supplemental oxygen. Nebulization of water (preferably heated) in the delivered gas, rather than bubbling gas through water, is necessary in order to raise the relative humidity to 90 to 100 percent at body temperature and thus avoid a humidity deficit in the proximal airway.

A65-81403
THE SPACE SUIT.
Bernard Kovit.
Space/Aeronautics, vol. 43, Jun. 1965, p. 43-49.

While isolating man from a hostile environment, the extravehicular space suit must also allow him to get around and work. At present, it is the resolving of mobility and comfort needs, not the environmental stresses, which taxes the suit designer. Whether the suit will be soft or a rigid capsule will be determined by the space activities required when groups of men are sent into space. It may be a dimensionally and dynamically responsive integument, about one inch thick, with life- and mobility-supporting properties.

A65-81404
THE BEHAVIOURAL BASIS OF PERCEIVED SIZE AND DISTANCE.
James G. Taylor (Defence Res. Med. Labs., Toronto, Canada).
Canadian Journal of Psychology, vol. 19, Mar. 1965, p. 1-14. 15 refs.

It is suggested that perceived distance is a function of behavior that is quantitatively adjusted to the distances of objects. This behavior is conditioned to compound stimuli whose components include changes of stimulation due to movement. If some of the cues, and particularly those that depend on movement, are eliminated experimentally, there is a quantitative decrease in the behavior that tends to be evoked, with a consequent shrinkage in perceived distance. This accounts for the common finding that perceived distance is a negatively accelerated increasing function of distance. Perceived size is a function of behavior quantitatively adjusted to the dimensions of objects. If this behavior can be evoked by objects at a distance we

get size constancy. In this case the cue include those that are conditioned to distance responses, and the result is size-distance invariance. This invariance is disrupted by cue reduction. For example, elimination of distance cues dependent on motion results in increasing overestimation of size as distance increases. Two size illusions (bird's eye illusion and expanding runway illusion) are explained in terms of the theory.

A65-81405
AGE AND SEX DIFFERENCES IN THE PALMAR SWEAT PRINT.
Antonio J. Ferreira and William D. Winter (San Jose State Coll., Calif.).
Psychosomatic Medicine, vol. 27, May-Jun. 1965, p. 207-211. 11 refs.
Grant Natl. Inst. of Mental Health MH 06560-01.

The importance of age and sex upon palmar sweating is demonstrated in a study of 768 normal individuals of both sexes ranging in age from 6 months to 80 years. Females were found to have greater palmar sweat than males. The general hypothesis that palmar sweat decreases with age was corroborated. However, it was found that the relation is not linear; palmar sweat increases rapidly from birth to age 7-8, when it reaches a plateau, beginning then to decrease slowly into adolescence, adulthood, and later years.

A65-81406
PATTERNS OF FAT MOBILIZATION IN FIELD-DEPENDENT AND FIELD-INDEPENDENT SUBJECTS.
W. E. McGough, A. J. Silverman, and M. D. Bogdonoff (Duke U. Med. Center, Depts. of Psychiat. and Med., Durham, N. C.).
Psychosomatic Medicine, vol. 27, May-Jun. 1965, p. 245-256. 20 refs.
Grants PHS A5509 and MH-05356-03; Grant AF Office of Sci. Res. 57-63; Grant Duke U. HD-00668-06; and Life Insurance Med. Res. Fund. supported research.

Ten field-dependent and 10 field-independent subjects received intravenous injection of insulin or saline. Free fatty acid (FFA), blood glucose, and urinary catecholamines were determined regularly. FFA levels were higher in the field-dependent controls with saline than in field-independent subjects. Fat mobilization patterns of field-dependent subjects showed greater variability both after insulin and saline, and their veins were significantly more prone to spasm. FFA levels dropped more abruptly and to a narrower range after insulin in the field-independent group. There were no significant differences in the catecholamine and blood glucose findings.

A65-81407
BINOCULAR MASKING INDUCED BY MOVING OBJECT.
C. C. Grindley and Valerie Townsend (Cambridge U., Psychol. Lab., London, Great Britain).
Quarterly Journal of Experimental Psychology, vol. 17, May 1965, p. 97-109. 14 refs.
Med. Res. Council supported research.

Movement in a part of either of two binocular fields can, under some conditions, produce temporary obliteration of the corresponding part of the other field. This paper is mainly a qualitative study of this rather surprising phenomenon. The effect is found to increase from the fovea to the periphery, to be greatest at a velocity of about 20° visual angle per sec and to vary with the orientation of the fixation point in the visual field. Some further lines of research designed to elucidate the relation of the effect described here to certain other visual phenomena are suggested.

A65-81408
DELAYED AUDITORY FEEDBACK AND SHADOWING.
Aubrey J. Yates (Western Australia, U., Perth).
Quarterly Journal of Experimental Psychology, vol. 17, May 1965, p. 125-131. 10 refs.

On the basis of speech disturbance under binaural delayed auditory feedback (DAF), groups of subjects of high and low susceptibility were formed. Both groups were required to shadow messages presented under four conditions: single message presented binaurally; message presented to one ear with either white noise, an irrelevant message, or delayed feedback of the repetition of the message, presented to the contralateral ear. For both groups the number of errors (omitted words) increased significantly in the irrelevant message and the delayed feedback conditions as compared with the binaural or white noise conditions. There was no difference between the susceptible and non-susceptible groups in the binaural and white noise conditions; but the susceptible group showed a much larger increase in the irrelevant message and delayed feedback conditions. Implications of these findings for theories of DAF are discussed.

A65-81409
COMPARATIVE ANALYSIS OF PROPRIOCEPTION IN LEFT AND RIGHT ARMS.
Marta Wyke (Natl. Hosp., Dept. of Neurosurg., Maida Vale, London, Great Britain).
Quarterly Journal of Experimental Psychology, vol. 17, May 1965, p. 149-157. 8 refs.
Med. Res. Council supported research.

Using the "kinaesthetic memory for the target" technique, differences in the accuracy of pointing to a target with the right and left arms are analyzed. The effect of rotation of the head to left and right upon this process is also studied. With the head normally orientated, it was found that pointing with the right arm is significantly better than with the left. Accuracy of pointing is greater with the target directly in front of the body than when it lies to either left or right side. When the head is rotated, the direction of the pointing error is inversely related to the direction of rotation. The study suggests that the precision of control over arm (in the absence of vision) is related to the varying ability of individual subjects to correlate limb movements with the prevailing orientation of the body, especially of the head and neck. This is additional to the influence of genetically-determined handedness and of the sensory input from the moving limb.

A65-81410
VISUAL DISCRIMINATION OF SHAPE BY HUMANS. II: (I) MATRIX FIGURES AND (II) MINIMAL AREA CHANGES.
J. Butler (Exeter U., Psychol. Lab., Great Britain).
Quarterly Journal of Experimental Psychology, vol. 27, May 1965, p. 163-168. 12 refs.
Encyclopaedia Britannica, Ltd. supported research.

Two experiments are described in which an attempt was made systematically to vary two-dimensional shapes according to a pre-arranged design. In the first, subjects were presented tachistoscopically with pairs of "reflexive matrix figures", whose members were either horizontally or vertically orientated; and it was found that reaction times to horizontal pairs were faster than to vertical ones, a result that is in keeping with previous findings. In the second experiment, two ensembles were devised that were alike in every respect save that one group was extended or reduced vertically while the other varied horizontally. Performance was better on the vertically orientated ensemble. These findings are briefly related to former studies and the pre-eminence of vertical symmetry is underlined.

A65-81411
THE PHASE DIFFERENCE FUNCTION IN BINOCULAR FLICKER.
P. J. Foley and P. Stager (Defence Res. Med. Labs., Toronto, Canada).
Canadian Journal of Psychology, vol. 19, Mar. 1965, p. 47-55. 9 refs.

Two experiments were carried out to determine the functional relation between the critical flicker frequency (CFF) of two identical intermittent targets, binocularly superimposed, and the phase difference between the targets. Binocular CFF is a monotonic decreasing function of phase difference, positively accelerated for phase differences between 0° and 180°, and negatively accelerated for phase differences between 360° and 180°. It is postulated that the results can be accounted for by assuming the existence of something akin to the "isodynamic" cells of Cajal, and that more weight is attached to the input to these cells from one eye than from the other.

A65-81412
SPECTRAL TRANSMITTANCE OF VISIBLE LIGHT BY THE LIVING HUMAN EYE.
Mathew Alpern, Samuel Thompson, and Myron S. Lee (Mich. U., Dept. of Ophthalmol., Ann Arbor).
Journal of the Optical Society of America, vol. 55, Jun. 1965, p. 723-727. 7 refs.
Grant Natl. Inst. of Neurol. Diseases and Blindness NB-01578-07.

The spectral transmittance of visible light has been estimated by measuring how much light is reflected back from the inside of the sclera of three human eyes in which the retina and choroid are absent. These in vivo measurements agree quite well with previous measurements of spectral transmittance of enucleated eyes. Clinical history of three cases are given in an appendix.

A65-81413
THE RELATIONSHIPS BETWEEN MINUTE VENTILATION, PULMONARY GAS DIFFUSION AND RESPIRATORY WORK MEASURED SIMULTANEOUSLY DURING A STANDARD EXERCISE TEST.
C. R. Woolf (Toronto U., Dept. of Med.; and Toronto Gen. Hosp., Cardio-Respirat. Lab., Ontario, Canada).
Diseases of the Chest, vol. 47, Jun. 1965, p. 616-626. 11 refs.
Grant Med. Res. Council MA680; and Grant Natl. Health CR 35.

Simultaneous measurements of minute ventilation, diffusing capacity, fractional carbon monoxide uptake, and the respiratory work equivalent for carbon monoxide were made during a standard exercise on normal subjects and patients with chest diseases. Eight different groups of inter-relationships were found. Normal minute ventilation during exercise occurred when gas exchange was normal, when compensation for abnormal gas exchange was easily achieved, and when the attempt to compensate for abnormal gas exchange was limited by a very high respiratory effort. Excessive hyperventilation during exercise was noted in some patients, due to nervousness. In others it occurred in an attempt to compensate for abnormal gas exchange. Statistical analysis showed that the degree of dyspnea could be correlated with increased respiratory work, especially when gas exchange was abnormal.

A65-81414
SURVIVAL IN THE JUNGLE.
Basil Clarke.
Royal Air Forces Quarterly, vol. 5, Summer 1965, p. 125-130

About 20 years ago a school was founded in Singapore under the auspices of the Royal Air Force, which offers a training course in survival in the jungle. The training applies to (1) natural products found in the jungle, (2) overcoming its difficulties and dangers, and (3) keeping fit and capable after surviving an air crash. The course lasts two weeks and starts with lectures and practical work, followed by an expedition into the deep jungle. Although present-day training methods differ considerably from those used at the beginning of the program, essentially the persons are taught to clear a path through the dense growth and use bamboo for making shelters, beds, stretchers, and emergency pack frames. Bamboo can be a source of potable water, and has parts which are edible. Directly and indirectly the school has saved many lives of airmen who would otherwise have perished after forced landings in the jungle.

A65-81415
HYPERBILIRUBINEMIA DUE TO HYPOXIA.
Yuzo Shibata (Saiseikai Gen. Hosp., Internal. Med. Serv.; and Kyushu U., Fac. of Med., Fukuoka, Japan).
Kyushu Journal of Medical Science, vol. 15, Dec. 1964, p. 87-94. 11 refs.

The ability of isolated perfused rabbit livers to take up and excrete bilirubin in a state of hypoxia or when oxygenated was investigated. During hypoxia, the isolated liver discriminated between crystalline bilirubin and icteric serum bilirubin. Hypoxia resulted in the inability of the liver to clear icteric serum bilirubin from perfusate. Hypoxia did not affect the crystalline bilirubin clearance ability of the liver, nor result in the accumulation of crystalline bilirubin in perfusate. A case of clinical hyperbilirubinemia in a patient with prolonged hepatitis and anemic heart insufficiency was presented. The relationship between hyperbilirubinemia and hypoxia was investigated.

A65-81416
SOME ASPECTS OF THE ACOUSTICALLY EVOKED RESPONSE TO THE CESSATION OF STIMULUS.
Darrell E. Rose (Monterey Inst. of Speech and Hearing, Calif.) and James C. Malone (Okla. U., Med. Center, Oklahoma City).
Journal of Auditory Research, vol. 5, Jan. 1965, p. 27-40. 13 refs.
Veterans Admin. Hosp. supported research.
Grant NIH NB03290.

Some of the characteristics of the "off-effect" evoked potentials are discussed in relationship to frequency, rise-decay time, and duration of stimulus. No general change in the evoked potential was noted as a function of the frequency or rise-decay time. In one subject, durations of 850-msec elicited an "off-effect" evoked potential, whereas a duration of 1500 msec was necessary in another subject. The configuration of the "off-effect" has an appearance similar to that of the "on-effect" evoked potential. It is hoped that the "off-effect" may be used as an additional aid in determining threshold to auditory stimulus by the evoked potential technique.

A65-81417
RELATIONSHIPS FOR TEMPORARY THRESHOLD SHIFTS PRODUCED BY THREE DIFFERENT SOURCES.
John L. Fletcher and Michel Loeb (U.S. Army Med. Res. Lab., Fort Knox, Ky.)
Journal of Auditory Research, vol. 5, Jan. 1965, p. 41-45.

Three exposure noises were employed including 15 min. of 600-1200 cps noise at 113 dB, 5 min. of 2400-4800 cps noise at 110 dB, and 1,000 pulses of impulse noise with a peak intensity of 160 dB. The latter were presented to 12 subjects, none of whom had hearing levels as high as 20 dB. Correlations were calculated for temporary threshold shift for each frequency for each condition and for the same frequencies across conditions. For the impulse noise, the significant correlations within conditions tended to be for adjacent frequencies, but this pattern did not hold as strongly for the other noises. In only one case, for the high frequency noise, was the shift at 2 kc correlated with that at 12 kc. Additionally, in only one instance was there a significant correlation for the same test frequencies across conditions. These results are in agreement with those previously cited in that they suggest the apparent lack of a general susceptibility factor.

A65-81418
APPARATUS FOR LUMINANCE-THRESHOLD DETERMINATION IN ANIMALS.
Charles S. Curran and Randal H. Thomas (Merck Inst. for Therap. Res., West Point, Pa.)
Journal of the Optical Society of America, vol. 55, Jun. 1965, p. 727-728.

A simple apparatus for determining luminance thresholds in animals is described. A General Electric electroluminescent lamp is used as the light source, since its luminance can be varied over many decades electrically while its spectral distribution remains invariant. The luminance of the lamp is varied over a 7-decade range in logarithmic increments by an add-subtract-type stepping switch. Programed pulses to the stepper increase the luminance; animal responses provide pulses to reduce luminance. A method of calibrating the light source with an Aminco photomultiplier microphotometer is described.

A65-81419
CONTRAST SENSITIVITY IN TEST FIELD WITH BRIGHT SURROUND.
D. A. Schreuder (Lighting Lab., Eindhoven, The Netherlands).
Journal of the Optical Society of America, vol. 55, Jun. 1965, p. 729-731.

A set of curves and two empirical formulas have been derived which represent the contrast sensitivity of the human eye when both the test-object and the test-field luminances are considerably lower than the adaptation level. Although derived to be used for the lighting of traffic tunnels, the data may be applied to a much wider range of visibility problems, as the results are not greatly dependent on changes in the experimental conditions.

A65-81420
EFFECT OF EXPOSURE TIME ON INDUCED COLOR.
Jo Ann S. Kinney (U. S. Naval Submarine Med. Center, Med. Res. Lab., Groton, Conn.)
(Opt. Soc. of Am., 1964 Fall Meeting, New York, N.Y.)
Journal of the Optical Society of America, vol. 55, Jun. 1965, p. 731-736. 14 refs.

The colors induced into neutral fields of either illuminant A or C by four surround colors: red, green, yellow, or blue, were determined for various exposure durations, ranging from 50 to 400 msec. The induced color was compared, using a binocular septum technique, with a field of colored light that could be varied in hue, saturation, and brightness. The effects of exposure time differed for the four inducing colors; red and blue have the most different effects. As the exposure time was lengthened, increasing saturations of green were induced by red, while decreasing saturations of yellow were induced by blue.

A65-81421
AN ESSAY ON BINOCULAR VISION.
Lord Charnwood
New York, Hafner Publishing Co., 1965, v+117 p. 159 refs.

In this monograph, several aspects of binocular vision are presented, including anatomy and mechanisms of action, visual reflexes (blink, fixation, convergence, and accommodation reflexes), theories of fusion of two uniocular images within the brain, abnormal conditions of muscles and visual angles, and binocular space perception. Chapter 4, on some investigations of binocular vision, reports some of the classical investigations of Sherrington, Luneburg, and others, with supplementary analyses by the author on flicker frequency, convergence, stereo-acuity, and related topics.

A65-81422
THE ORGAN OF CORTI: ITS HISTOPHYSIOLOGY AND HISTOCHEMISTRY.
Ia. A. Vinnikov and L. K. Titova.
New York, Consultants Bureau, 1964, xix + 253 p. Many refs.
$13.50.

The book covers the following topics: (1) problems of histophysiological and histochemical investigation of the organ of corti; (2) morphology of the cochlea and the organ of corti, including the latest findings obtained by means of the electron microscope; (3) physiology and biophysics of the cochlea, including details of the localization of audio frequency reception in the organ of corti; (4) movement of cochlea structures under the influence of sound and electrical potentials; (5) description and evaluation of modern theories of hearing (6) description of an original method of extraction of the organ of corti from the temporal bone and its isolation in a viable state; (7) histophysiological and cytophysiological state of the organ of corti at rest and during auditory stimulation; and (8) evolution of the structure and function of the organ of corti and the functional evolution of the hair cells. In conclusion, the authors formulate a cytochemical theory of hearing on the basis of present day knowledge.

A65-81423
OPTICAL ILLUSIONS.
S. Tolansky (London U., Great Britain).
Oxford, Pergamon Press, 1964, ix + 156 p. 11 refs.
$5.00.

A survey of geometrical optical illusions is presented for the benefit of the layman, artist, or scientist rather than the professional psychologist. The optical illusions include those in nature, the effect of weak wings, convergence-divergence illusion, and illusions of full and empty spaces, the annulus, curvature, diagonal, crossed-bar, setting sun and moon, hatched lines, and also those illusions involving oscillation of attention or due to instrumentation.

A65-81424
THEORY OF SIGNAL DETECTABILITY: DEFERRED-DECISION THEORY.
T. G. Birdsall and Richard A. Roberts (Mich., U., Dept of Elec. Eng., Cooley Electron. Lab., Ann Arbor).
Journal of the Acoustical Society of America, vol. 37, Jun. 1965, p. 1064-1074. 5 refs.

The theory of signal detectability is extended to include observation-decision procedures in which the available observation time is bounded. The special case of a simple signal hypothesis with stationary normal observation statistics is worked in detail. ("Signal known exactly in added white Gaussian noise" is an example of such a case). The optimizaion is of the minimum average risk type, with constant cost of observation to facilitate comparison with work based on Wald's sequential analysis and comparison with fixed observation procedures. An unexpected result is that for large available observation lengths, approaching Wald's unbounded case, the optimization dictates that the primary improvement is in error performance rather than observation time.

A65-81427
THEORY FOR PSYCHOPHYSICAL LEARNING.
M. S. Schoeffler (Bell Telephone Labs., Inc., Murray Hill, N. J.)
Journal of the Acoustical Society of America, vol. 37, Jun. 1965, p. 1124-1133. 22 refs.

A model for psychophysical learning is constructed by imposing some conditioning principles on concepts derived from the theory of singal detectability. The effects of a priori probability, feedback, and practice are derived in part by Monte Carlo simulation and in part by analysis. The theory makes some novel predictions for the effects of these variables, all of which find support in the literature. Some theoretical results are: (a) performance improves with practice; (b) feedback can be detrimental to performance in a psycho-physical task; (c) when the a priori probabilities of the stimuli are unequal and feedback is provided, the response criterion moves in the direction of optimality, but does not move far enough to reach optimality; however, when no feedback is provided, the criterion moves in the opposite direction.

A65-81428
LOUDNESS CHANGE OF PURE TONES WITH CONTRALATERAL NOISE STIMULATION.
Erik Vigran (Oslo, U., Inst. of Phys., Norway).
Journal of the Acoustical Society of America, vol. 37, Jun. 1965 p. 1134-1138. 12 refs.

Loudness change of pure tones is measured with contralateral stimulation of narrowband noise. A "paired comparison" method was used, and an increase in loudness was found at tone SPL 80 dB in the applied frequency interval 300-1500 cps. The contralateral stimulus was 1/3 oct. white noise with center frequency 2500 cps. A maximum loudness increase corresponding to 7-8 dB in SPL was found with noise SPL 100 dB. It is assumed that the measured effect cannot be due to the middle-ear muscle reflex, but must be explained in terms of central interaction.

A65-81429
EFFECT OF ALTITUDE (HYPOXIA) ON CORONARY ARTERY SIZE IN THE WHITE RAT.
Andrew Kerr, Jr., Robert B. Diasio, and William J. Bommer (Veterans Admin. Hosp., Cardiopulmonary Lab., Batavia, N. Y.)
American Heart Journal, vol. 69, Jun. 1965, p. 841. 6 refs.

The effect of hypoxia without anemia was studied on young white rats maintained at a simulated 22,000 feet altitude for 15 days, for 2 hrs a day. At this altitude, the oxygen tension was reduced to 67 mm Hg. Three rats died during the experiment. At the end of the experiments the animals were sacrificed. The results showed that hypoxia without anemia produced significant growth of cornonary arteries. A slight loss of body weight was noted. Ratio of heart weight to body weight was slightly increased. Hematocrit also showed a slight rise.

A65-81430
FOURTEENTH PACAF MEDICAL CONFERENCE: PROFESSIONAL PAPERS.
Tokyo, Japan, [n.p.], [1965]. Separately paged.

Complete papers of military medical interest are presented as given at the Fourteenth Pacific Air Force Medical Conference in Dec., 1964. Among these papers are articles pertinent to aerospace medicine, and these have been abstracted separately.

A65-81431
SUDDEN HEARING LOSS-A MEDICAL EMERGENCY.
Francis J. Peisel (U.S. Army Tripler Gen. Hosp., Honolulu, Hawaii).
IN: FOURTEENTH PACAF MEDICAL CONFERENCE: PROFESSIONAL PAPERS, TOKYO, JAPAN, NOV. 30-Dec. 2, 1964.
[n.p.], [1965], Separately paged.

A discussion is presented on the cause, symptoms and pathology of sudden hearing loss. It is believed that the cause is based on vascular spasm, although other mechanisms have been held responsible. A six week treatment is described utilizing histamine, vasodilators, and vitamin C. Recovery as high as 62% is recorded if the therapy is started soon enough. Case histories of flying personnel are given.

A65-81432
HAZARDOUS NOISE EXPOSURE IN MILITARY PERSONNEL: A PROGRAM FOR HEARING CONSERVATION.
Jerrad J. Hertzler.
IN: FOURTEENTH PACAF MEDICAL CONFERENCE: PROFESSIONAL PAPERS, TOKYO, JAPAN, NOV. 30-DEC. 2, 1964.
[n.p.], [1965], separately paged.

The author describes the problems in setting up a hearing conservation program at a U. S. Air Force base. The findings are reviewed and further improvements are suggested. The problems centered around the Naha Air Base in Okinawa, where extensive use is made of jet aircraft. Noise hazards of various work areas are discussed, and a program of screening audiography for a three-month period was set up. Personnel both military and civilian were classified as to hearing acuity, and a large percentage had bad hearing (class C). A program for future screening was initiated. The personnel with Class C hearing were removed from hazardous areas and tested every 90 days. An educational program was begun, and being reinforced by the testing, personnel became aware of more of the dangers to hearing.

A65-81433
THE EFFECTS OF SMOKING ON NIGHT VISION.
Kyoung Uk Rhee, Dae Soo Kim, and Yong Sik Kim.
IN: FOURTEENTH PACAF MEDICAL CONFERENCE: PROFESSIONAL PAPERS, TOKYO, JAPAN, NOV. 30-DEC. 2, 1964.
[n.p.], [1965], separately paged. 8 refs.

A study has been carried out to discover any decrement of night vision in airmen due to the effects of smoking. Forty airmen were used (20 smokers and 20 nonsmokers). After a period of dark adaptation, the men stayed in a dark room and read a set of letters flashed on a screen. The subjects then smoked a cigarette within 10 minutes and were retested for reading distance of the letters. The after-smoking distance in both groups was significantly shorter. The distance shortened in smokers was 10% and 15% in nonsmokers. Total recovery was the same in both groups and occurred in about 30 minutes.

A65-81434
SOME EXPERIMENTAL DATA ON MOTION SICKNESS.
Isamu Watanabe, Yasushige Okamoto, Atsushi Okutomi, Masayuki Iwasaki, Tadashi Shoji, Ken-ichi Okasaka, Shigeru Narabayashi, and Yasushi Ishizu (SDF Central Hosp., Tokyo, Japan).
IN: FOURTEENTH PACAF MEDICAL CONFERENCE: PROFESSIONAL PAPERS, TOKYO, JAPAN, NOV. 30-DEC. 2, 1964.
[n.p.], [1965], separately paged. 7 refs.

A series of studies were performed to study the relationship of motion sickness to other functions. The external auditory canals were stimulated calorically with cold and hot water (10-48° C) in five males, while the circulatory changes were observed in arm and fingers. After stimulation of the labyrinth there was an increase in blood volume of the forearm due to activation of the cholinergic vasodilator system. In a second series of experiments 20 men, after ingesting water, were exposed to coriolis accelerations. Symptoms of motion sickness were produced and water diuresis, which had begun before the acceleration was stopped. This anti-diuretic phenomenon was observed in all subjects. Even after further tests no habituation was observed. In a third series of tests, 2° men were rotated while the body was inclined backwards. Nystagmic movements were recorded. In cases where motion sickness occurred from the acceleration, nystagmus and respiratory movements were irregular. When no motion sickness was observed, respiration was normal and nystagmus was of large amplitude.

A65-81435
AERODONTALGIA.
Renaldo G. Parisi and William G. Elliott.
IN: FOURTEENTH PACAF MEDICAL CONFERENCE: PROFESSIONAL PAPERS, TOKYO, JAPAN, NOV. 30-DEC. 2, 1964.
[n.p.], [1965], separately paged.

Toothaches provoked by low barometric pressure during aircraft flight are now a major problem ranking fifth in all conditions resulting from exposure to low pressure. It has been observed in 1 to 3% of Air Force flying personnel. Symptoms are discussed in relation to diagnosis which is often difficult. A case history is given and suggestions are made for grounding aircrew members, especially pilots. The activating mechanism of this ailment is still unknown, but it is speculated that circulatory disturbances may prevent equalization of gases and liquids in tissue and pulp cavity.

A65-81436
PHYSIOLOGICAL MONITORING IN FLIGHT OF JASDF PILOT
Zenichiro Fujie (JASDF, Aeromed. Lab., Tachikawa, Japan).
IN: FOURTEENTH PACAF MEDICAL CONFERENCE: PROFESSIONAL PAPERS, TOKYO, JAPAN, NOV. 30-DEC. 2, 1964.
[n.p.], [1965], separately paged.

A report is given of preliminary experiments with multi-channel telemetry equipment for monitoring physiological reactions in Japanese pilots of F-86F aircraft. A brief description of the instrumentation is given. The tracings of electrocardiogram, airspeed, altitude, and acceleration are briefly reported. Heart rate was monitored during all phases of flight, and results from several flights showed increased heart rate during takeoff and landing. Illustrations of the equipment are included.

A65-81437
AERODONTALGIA.
John T. Murphy.
IN: FOURTEENTH PACAF MEDICAL CONFERENCE: PROFESSIONAL PAPERS, TOKYO, JAPAN, NOV. 30-DEC. 2, 1964.
[n.p.], [1965], separately paged. 20 refs.

A discussion is given of the history, incidence, cause, diagnosis, and treatment of toothaches caused by aircraft flight. The incidence rate from various periods are quoted, while the USAF Flight Surgeon's Manual gives the incidence of 9% for fighter pilots. The pain produced can be great enough to render the individual completely incapacitated. The normal tooth and pulp is not usually involved, but some predisposing factor is considered to make the tooth capable of reacting. A list of the factors is given. Isolation of the offending tooth is difficult, and methods of diagnosis are discussed. Temperature and use of oxygen at altitude have no causative effect, but it is thought that the reduced pressure is the condition of flight that produces the toothache. Treatment should not only relieve symptoms, but should find the dental condition responsible for the pain.

A65-81438
BRIGHTNESS CONSTANCY UNDER A GRADIENT OF ILLUMINATION.
Elmer H. Davidson and Robert B. Freeman, Jr. (Pa. State U., University Park).
Psychonomic Science, vol. 2, Jun. 15, 1965, p. 349-350. 10 refs.
Grant Natl. Inst. of Mental Health 08856.

Ten undergraduates, five with and five without fixation, matched the brightness of two self-luminous disks at different positions on a reflecting background illuminated by an approximately linear gradient of illuminance. Judgments approaching brightness constancy were obtained even when the luminance of the test fields exceeded that of the background. The effect of the background was slightly, but not significantly, greater with fixation than without.

A65-81439
EFFECTS OF FIGURE-GROUND CONTRAST AND CONTOUR ORIENTATION ON FIGURAL MASKING.
Robert H. Pollack.
Psychonomic Science, vol. 2, Jun. 15, 1965, p. 364-370. 9 refs.

Figural masking was investigated as a function of the amount of the contrast between concentric, successively-presented figures, and also as a function of the parallelism of the contours of the figures. It was found that masking occurred only when contrast was great and occurred to the greatest degree when contours of the inner and outer figures were parallel. Masking was inhibited by nonparallelism and by the presence of angles within the masked figure.

A65-81440
A NOTE ON FURTHER EXPERIMENTS ON THE EFFECTS OF MEPROBAMATE ON DISCRIMINATION PERFORMANCE IN THE MONKEY.
L. Weiskrantz and Victor Baltzer (Cambridge, U., Psychol. Lab., Great Britain).
Quarterly Journal of Experimental Psychology, vol. 27, May 1965, p. 169-172.

A previous experiment has shown that performance on a successive auditory discrimination task is impaired by injections of meprobamate. The present two brief experiments indicate that the drug also impairs simultaneous visual discrimination performance, although not to the same degree as found earlier for auditory discrimination. The original finding, therefore, cannot be attributed simply to unique features of the auditory discrimination situation, such as the "go-no-go" response contingency. Since neither overtraining nor drug habituation appears to be of great importance, it is suggested that the lesser effect of the drug in these experiments reflects the greater stability of visual than auditory habits in the monkey.

A65-81441
THE RIGHTING REFLEX IN THE RABBIT DURING BRIEF PERIODS OF SUBGRAVITY [IL RIFLESSO DI RADDRIZZAMENTO NEL CONIGLIO DURANTE BREVI PERIODI DI SUBGRAVITA].
R. Caporale (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Jan.-Mar. 1965, p. 10-25. 10 refs. In Italian.

Following a survey of previous experimental research dealing with vestibular function during weightlessness, an experiment is described of the righting reflex of open-eyed and blindfolded rabbits exposed to short periods of weightlessness on the subgravity tower. The righting reflex, an expression of a labyrinthine reflex, permits evaluation of vestibular function. The rabbit's behavior during the experiment was studied by means of motion pictures. It was observed that during weightlessness the righting reflex of open-eyed rabbits persisted whereas the reflex of blindfolded rabbits was lacking. These findings affirm that the weightless state, by producing a lack of utricular and saccular graviceptor function, inhibits the righting reflex and prove that weightlessness exerts an effect on vestibular function.

A65-81442
CONTRIBUTION TO THE EXPLORATION OF CARDIOVASCULAR FUNCTION IN MILITARY JET PILOTS [CONTRIBUTO ALL'ESPLORAZIONE FUNZIONALE CARDIO-VASCOLARE DI PILOTI DI AVIOGETTI MILITARI].
Antonio Maria De Angelis (Bologna U., Ist. di Clin. Med. e Terapia Med., Scuola di Perfezionamento in Cardiol., Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Jan.-Mar. 1965, p. 46-61. 12 refs. In Italian.

Following a brief review of the most evident cardiovascular changes induced by modern flight, the findings are reported of electrocardiographic and blood pressure studies made on 22 pilots, with an average age of 29 years, just before and after flight. It was constantly observed that heart rate and blood pressure increased within physiological limits. These results were in accordance to those previously reported in the literature. Included is a technical appendix describing modern methods of cardiovascular exploration (telemetric and electrocardiocorder methods) which are useful in recording in-flight cardiovascular data. Included is a table of the heart rate and blood pressure values of pilots before and after flight and representative electrocardiogram tracings.

A65-81443
A SIMPLE DEVICE FOR THE COLLECTION OF BLOOD SAMPLES FROM SUBJECTS SUBJECTED TO ACCELERATIONS BY MEANS OF A CENTRIFUGE [UN SEMPLICE DISPOSITIVO PER LA RACCOLTA DI CAMPIONI DI SANGUE DI SOGGETTI SOTTOPOSTI AD ACCELERAZIONI MEDIANTE CENTRIFUGA].
F. Rossanigo (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Jan.-Mar. 1965, p. 77-81. In Italian.

A description is presented of the method and apparatus used in obtaining blood samples from subjects during centrifugal acceleration experiments. The apparatus consists of two units with two syringes permitting the obtaining of two blood samples through catheters inserted into the subject's circulatory system during movement of the centrifuge. The blood is easily passed through another catheter aided by an electromagnet which commands the release of the piston of the second syringe. This method is suitable for obtaining arterial and venous blood samples from animals using catheters during centrifugal movements up to 15 g. Included is a diagram and photograph of the apparatus.

A65-81444
COMPARISON OF EFFICIENCY OF CERTAIN TYPES OF AIRBORNE BACTERIA SAMPLERS BY MEANS OF INERT MONO- AND POLYDISPERSED AEROSOLS [COMPARAZIONE DELL'EFFICIENZA DI ALCUNI TIPI DI CAMPIONATORI DI BATTERI AEROGENI CON L'IMPIEGO DI AEROSOL INERTI MONO E POLIDISPERSI].
L. Mammarella (Centro Tec. Chim.-Fisico Biol. dell'Esercito, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Jan.-Mar. 1965, p. 62-76. In Italian.

A method is reported for comparing the efficiency of samplers used for collecting airborne bacteria by means of inert mono- and polydispersed aerosols. It was found that in addition to the efficiency of millipore membrane filters, slit samplers were excellent for obtaining three micron particles (average size of nuclear drops). The holed disk sampler was very effective for collecting particles of three microns in size and up. In the three micron range its efficiency was about half that of the slit sampler. The vault sampler, spherical segment sampler, and cascade vault sampler were more suitable for the collection of particles in large masses.

A65-81445
THE SPACE PROJECT OF THE RUSSIANS BELIAEV AND LEONOV AND THAT OF GRISSOM AND YOUNG FROM THE UNITED STATES [L'IMPRESA SPAZIALE DEI RUSSI BELYAYEV E LEONOV E QUELLA DEGLI STATUNITENSI GRISSOM E YOUNG].
L. M. T.
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Jan.-Mar. 1965, p. 3-9. In Italian.

A report is given of the flight of Russian astronauts Pavel Beliaev (37 years of age) and Alexei Leonov (30 years of age) on March 18, 1965, in the Voskhod II spacecraft. The craft attained a perigee of 173 kilometers and an apogee of 495 kilometers. The flight was the first in which an astronaut (Leonov) exited from a space capsule and into space for a period of 20 minutes. His movements were recorded by television camera. Both astronauts slept and ate during the mission and regularly observed their respiration and cardiac frequency. Quoted extensively are published comments by T. Lomonaco (Giornale d'Italia, March 1965) relative to this historic flight. Briefly reviewed is the American space mission of Virgil Grissom (38 years of age) and John W. Young (34 years of age) in the Gemini spacecraft. The space vehicle attained a perigee of 162 kilometers, an apogee of 230 kilometers, and completed 3 orbits around the Earth in 4 hours and 55 minutes.

A65-81446
PRACTICAL ASPECTS OF PROBLEMS POSED BY SLEEP IN THE AIR FORCE [ASPECTS PRACTIQUES DES PROBLEMES POSES PAR LE SOMMEIL DANS L'ARMEE DE L'AIR].
R. Angiboust (Centre d'Enseignement et de Rech. de Méd. Aéron., Lab. de Neuro-Psychophysiol., Paris, France).
Revue de Corps de Santé des Armées Terre Mer Air, vol. 5, Dec. 1964, p. 731-739. In French.

Keeping awake is a major problem of night flying as the task is long and the work monotonous. Moreover, the introduction of the automatic pilot and other equipment, and cabin pressurization to improve the pilot's comfort, have greatly favored the induction of sleep. It is possible that many accidents attributed to human factors and classed as judgement errors are in reality due to the degradation of the pilot's vigilance level. Lack of sleep does not produce immediate effects, but its consequences may be seen on the following day or thereafter. Changes in sleep patterns produced by modification of the nycthemeral rhythm and social factors affect the pilots biological equilibrium. Environmental factors, such as heat and noise, initially produce a state of vigilance but during the course of flying lead to a state of sleepiness. Humoral factors play an important role in the induction of sleep. Ingestion of drugs or pathological conditions, as uremia and diabetes, produce sleep. To aid night flying, it is recommended that systematic pharmacodynamic drugs (amphetamines, synthetic psychoanaleptics, psychotonics) be used in order to maintain a state of vigilance. Some drugs must be used with caution since they produce secondary effects.

A65-81447
A COMPARISON OF ERROR IN FIVE SORTING PROCEDURES FOR ORDINAL RANKING.
Joseph M. Madden, Joe T. Hazel, and Roger D. Bourdon (Aerospace Med. Div., 6570th Personnel Res. Lab., Lackland AFB, Tex.)
Journal of Applied Psychology, vol. 49, Jun. 1965, p. 170-171.

The effect of sorting procedures on ranking error was investigated. Different groups of subjects ranked a series of 50 stimulus cards using 5 different sorting methods. Significant differences in ranking errors among the five methods were observed, with a "free" procedure showing less error than "structured" procedures.

A65-81448
EXPERIMENTS ON A POSTURAL AUTOKINETIC EFFECT.
Zella Luria (Tufts U., Dept. of Psychol., Medford, Mass.)
Journal of Psychology, vol. 60, May 1965, p. 87-101. 10 refs.
Ind. U. Graduate School supported research.

Six groups of subjects responded to a darkroom situation with and without suggestion of movement introduced by the experimenter. One group, given verbal suggestion of movement, reported movement significantly more frequently than did groups which received no verbal suggestion of movement. A second group, given neutral instructions, reported significantly fewer movement responses than did all groups which received suggestion instructions. A retest of subjects in the second group, with the suggestion of movement, showed that both the suggestion and the previous experience affected the group's movement responses. A third group yielded results indicating that the use of auditory stimulation did not determine the frequency of movement response. The final groups present evidence of the efficacy of apparatus as a means of introducing suggestion of response. Subjects given suggestion instructions were found to be less responsive to stimuli unrelated to the suggestion than were other experimental groups. Subjects reporting movement were found to be no more highly susceptible to motion sickness than were subjects not reporting movement.

A65-81449
EFFECT OF EXPOSURE OF ONE EYEBALL TO ULTRASOUND ON THE CEREBRAL VISUAL CENTERS IN THE RABBIT.
Józef Jankowiak and Czeslaw Majewski (J. Struś City Hosp., Dept. of Pathol. Anat.; and Balneoclimatol. Inst., Poznan, Poland).
American Journal of Physical Medicine, vol. 44, Jun. 1965, p. 109-112.

After 10 exposures of the right eyeballs of rabbits to ultrasound with frequency of one megacycle at 0.1 watt per cm^2 for 1 min on alternate days in the course of 20 days, atrophy of the horizontal nerve fibers of the nervous layer of the retina, both on the side of the eyeball exposed to ultrasound and on the unexposed side, and focal demyelinization of the nerve fibers of the optic nerve and in the region of the visual centers in both cerebral hemispheres were found.

A65-81450
EVALUATION OF LOCAL ISCHEMIA, GENERAL ANOXIA, AND VASODILATORS IN REACTIVE HYPEREMIA.
William F. Geber and James M. Schwinghamer.
Angiology, vol. 16, May 1965, p. 256-266. 20 refs.
S. Dak. Heart Assoc. supported research.

The relationship of local ischemia, general anoxia, and vasodilator metabolites to the production of reactive hyperemia has been investigated utilizing the vasculature of the hind limb of the dog. The oxygen tension of the circulating blood was reduced to extremely low values by progressive reduction of respiration rates to zero and by inhalation of pure nitrogen at normal respiration rates. Very short occlusive periods (three seconds) produced hyperemic responses. Venous occlusion, in contrast to arterial occlusion, did not produce a hyperemic response. When a venous occlusion preceded or was simultaneous with the arterial occlusion, the resulting hyperemia was much less than with the arterial occlusion alone. Relatively large amounts of lactic acid injected directly into the femoral circulation were required to produce a relatively small increase in blood flow. Compounds known to antagonize the action of histamine and serotonia were ineffective in altering the hyperemic response.

A65-81451
NINTH BOWDITCH LECTURE: ATMOSPHERE AND OXYGEN.
Daniel L. Gilbert.
Physiologist, vol. 8, Feb. 1965, p. 9-34. 74 refs.

It is speculated that during the time that the atmosphere of a planet changes from one composed of molecular hydrogen, helium, water, methane, and ammonia into one composed of carbon dioxide and molecular nitrogen, a "life-stage" is possible, providing there is available an adequate energy source and providing that the duration of the transition is long enough to give rise to a biosphere. Although a biosphere can obtain energy without using molecular oxygen, a biosphere can obtain more energy by using oxygen. However, there is a price to be paid by this oxygen utilization, since oxygen really represents a double-edged sword. It supplies the energy for life, but it also destroys living material. Thus, the price paid by the biosphere for this convenient source of energy is oxygen toxicity. Antioxidant defense mechanisms were evolved by the biosphere in order to combat the destructive influence of oxygen.

A65-81452
PERSONALITY CHANGES AFTER SENSORY DEPRIVATION.
G. David Cooper, Henry B. Adams (Veterans Admin. Hosp., Richmond Va.), and Louis D. Cohen (Duke U., Durham, N. C.).
Journal of Nervous and Mental Diseases, vol. 140, Feb. 1965, p. 103-118. 38 refs.

Two hypotheses concerning partial sensory deprivation were tested: (1) psychological functioning of psychiatric patients will improve after exposure to a brief period of partial sensory deprivation, and (2) significant relationship may be demonstrated between personality characteristics and differential responses to deprivation. Forty white male psychiatric patients in two groups equated for age, education, and scores on five measures of ego strength, were used as subjects. One group received three hours of sensory deprivation while the other served as controls. Both hypotheses were supported. On three of the five measures the deprivation group showed significantly more improvement. Several indices from predeprivation Rorschach protocols predicted individual differences in the direction of personality changes following deprivation. Differing responses to deprivation seem to be determined largely by each individual's characteristic pattern of ego functioning. Certain parallels are observed in individual differences of reaction of normal individuals to sensory deprivation.

A65-81453
SMALL BLOOD VESSELS AND THE ORIGIN OF PHAGOCYTES IN THE RAT CEREBRAL CORTEX FOLLOWING HEAVY PARTICLE IRRADIATION.
David S. Maxwell and Lawrence Kruger (Calif., U., Dept. of Anat. and Brain Res. Inst., Los Angeles; and Veterans Admin. Hosp., Long Beach, Calif.).
Experimental Neurology, vol. 12, May 1965, p. 33-54. 48 refs.
Grants PHS B-3604 and B-2685; and AEC AT(11-1)-34.

Alterations in the structure of small cerebral vessels were studied with the electron microscope at various intervals following ionizing particle irradiation. The disruption of small vessels required heavier doses of irradiation than is required for destruction of neural or glial elements. The appearance of large phagocytes which might be identified with the compound granular corpuscle is dependent upon and correlated with perivascular reaction. These cells appear to be derived from the pericytes of small vessels and not from any glial element within the brain parenchyma. The appearance of dense bodies or lamellar inclusions in cytoplasm cannot constitute evidence of phagocytosis. The only cerebral element which appears to display macrophage activity seems to be derived from the vascular pericyte. It is suggested that mesodermal elements only extend beyond the basal lamina of vessels under conditions of tissue disruption. The implications of these findings with respect to the designation "microglia" is discussed.

A65-81454

DETERMINATION OF MOBILITY OF NERVOUS PROCESSES BY PHOTIC STIMULATION IN ELECTROENCEPHALOGRAMS [OB OPREDELENII PODVIZHNOSTI NERVNYKH PROTSESSOV PO REAKTSII USVOENIIA RITMA SVETOVYKH MEL'KANII].

A. O. Dolin, D. A. Farber, and IU. F. Zmanovskii.

Zhurnal Vysshei Nervnoi Deiatel' Nosti, vol. 15, Mar.-Apr. 1965, p. 381-392. 47 refs. In Russian.

Peculiarities of photic stimulation were studied on the electroencephalogram in animals in the inhibitory phases of experimental seizures in early ontogenesis and in the first days of postnatal life as well as in healthy people and elderly women with neurotic disorders during the climacteric period. In the women, systemic motor conditioned reflexes were also investigated. It has been found that photic driving is observed at various functional conditions of the cerebral cortex. An important part in its formation is played not only by the specific system, but also by influences from the reticular formation of the brainstem. In investigations on man, there was no conformity between the characteristics of stimulation and the reversal of signal meaning of conditioned stimuli. This is apparently due to the difference in the physiological mechanisms of the phenomena under investigation.

A65-81455

DEPENDENCE OF PERCEPTION OF PHOTIC SIGNALS ON THE INTERVALS BETWEEN THEM [ZAVISIMOST' VOSPRIIATIIA SVETOVYKH SIGNALOV OT INTERVALOV MEZHDU NIMI].

IUi Ven'-Chzhao (M.V. Lomonosov Moscow U., USSR).

Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 15, Jan.-Feb. 1965, p. 70-78. 5 refs. In Russian.

A study was made of the influence of intervals between signals on the latencies of responses and the aftereffect in EEG and EMG and on the probabilities of the appearance of responses and false alarms in EEG and EMG. Seventy experiments were performed on five subjects. As the intervals between the signals are lengthened from 10 to 30 sec the latency and aftereffect in EEG and EMG become longer in a linear way. Then their course is of an oscillatory nature. If the intervals between signals are lengthened and the stimuli are weaker, then the probability of the appearance of a response in EEG and EMG drops from unity to zero. With the lengthening of the intervals between the signals from 10 to 30 sec, the probability of false alarms in EEG at first increases and then fluctuates around one level. No such regularity is observed in EMG.

A65-81456

BRAIN METABOLISM AND RESISTANCE OF A HIBERNATOR (CITELLUS CITELLUS) AND THE RAT TO DIFFERENT ANOXIC CONDITIONS, INCLUDING CARDIAC ARREST IN DEEP HYPOTHERMIA.

R. K. Andjus, T. Ćirković, Nadežda Čuperlović, J. Davidović, Vukosava Marković-Uskoković, and T. Velimirović (Belgrade U., Fac. of Sci., Inst. of Physiol.; and Inst. of Biol., Yugoslavia).

(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/1, 1964, p. 9-22; Discussion, p. 22-23. 17 refs.

Comparative experimental studies showed that ground squirrels, who are typical hibernating animals, were capable of tolerating deeper hypothermia than rats. They could be fully reanimated in 100% of the cases after 3 hours of complete cardiac arrest at 0° C body temperature, while rats could tolerate the same conditions only for 60 to 70 minutes. Fifty percent of the ground squirrels survived an exposure for 5.5 hours. Repeated exposures produced an increase in tolerance time to 7 hours. Ground squirrels could tolerate acute anoxia better than rats. They were capable of reaching a much greater concentration of brain lactic acid under anoxic conditions after occlusion of the trachea at 15°C body temperature, and after cardiac and respiratory arrest at 0° C. The greater resistance appears to be linked to an increased capability of exploiting those taking place in the brain.

A65-81457

A REPORT ON STUDIES WITH MARMOTA MONAX. I. BIOCHEMICAL AND PHARMACOLOGICAL INVESTIGATIONS OF BLOOD AND BROWN FAT.

W. G. Bigelow, A. S. Trimble, E. Schönbaum, and L. Kovats (Toronto, U., Banting Inst., Cardiovascular Lab., Canada).

(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/3, 1964, p. 37-48; Discussion, p. 49-50. 16 refs.
Defence Res. Board of Canada; Natl. Res. Council; Ontario Heart Found; and J. S. McLean Found. supported research.

A brief outline is given of nine years' research designed to extract a biologically active substance from hibernating animals, related to the phenomenon of hibernation. Testing for physiological activity is based on the premise that such a substance would increase the tolerance to low body temperature of nonhibernating test animals. Although minimal positive results have been obtained on occasion, no really reliable evidence of such a humoral agent has yet been found. The reasons why this team adhered to the humoral theory of hibernation are given.

A65-81458

CHANGES IN REGIONAL BLOOD FLOW AND BLOOD VOLUME, DURING AROUSAL FROM HIBERNATION.

Robert W. Bullard (Ind. U., Dept. of Physiol., Bloomington).

(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/5, 1964, p. 65-74; Discussion, p. 75-76. 15 refs.
Contract DA 49-007-MD-947; and Grant PHS H-6308.

Changes in regional blood flow and blood volume have been determined by radioisotope methods in arousal of the thirteen-lined ground squirrel. In early arousal most of the increased cardiac output was distributed to thoracic tissues and axillary brown fat. As arousal progressed to a heart rate of 200 beats per minute, blood flow to the anterior portion of the animal increased. The final stages of arousal were characterized by an increase in flow to posterior regions. No shifts of blood volume of hemodynamic significance could be demonstrated. However, the volume of distribution of injected albumin tagged with iodine was lower in arousal animals than in controls.

A65-81459

CONTINUOUS PHYSIOLOGICAL MEASUREMENTS FROM UNRESTRAINED ARCTIC GROUND SQUIRRELS (CITELLUS PARRYI).

G. Edgar Folk, Jr. and Mary A. Folk (Iowa, U., Dept. of Physiol., Iowa City).

(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/11, 1964, p. 157-172; Discussion, p. 173. 8 refs. ONR; and Iowa Heart Assoc. supported research.

The daily (circadian) rhythm was studied in Arctic ground squirrels at Barrow, Alaska, under conditions of continuous light (in July). There was no daily regularity in illumination, because clouds often caused dark days, while nights were sunny. Body temperature and heart rate of the animals, determined by implanted radiocapsules showed a clearcut daily (circadian) rhythm, which remained in phase with the clock. There was no Aschoff effect (daily resetting). Two animals were maintained in cold and darkness in an attempt to extinguish the rhythm. The daily body temperature of one animal was timed to begin between 3 p.m. and 4 p.m. each day for two weeks without any known clue from the external environment. Recording of daily heart rate provided data on true resting heart rate, which indicated three types of cardiac rhythm of this species.

A65-81460

THE TRANSFER OF INCREASED TOLERANCE TO LOW BODY TEMPERATURES BY THE HETEROLOGOUS TRANSPLANTATION OF BROWN FAT AND THE INFUSION OF PLASMA FROM HIBERNATING GROUNDHOGS.

B. S. Goldman and W. G. Bigelow (Toronto, U., Banting Inst., Cardiovascular Lab., Canada).

(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/12, 1964, p. 175-183; Discussion, p. 183-184. 13 refs. Ontario Heart Found.; and J. S. McLean Found. supported research.

Guinea pigs with transplants of brown fat from hibernating groundhogs showed an increased capacity to withstand low body temperature, surviving 3.23° C lower than controls. Direct blood cross-circulation between groundhogs and rabbits and dogs proved to be unsatisfactory because of technical difficulties. Nevertheless, three dogs showed lowering of temperature by 2.7° C as compared with controls. The infusion of stored, frozen, and then thawed plasma of groundhogs into rabbits produced no significant results. However, the infusion of fresh plasma produced a significant increase in tolerance to low body temperatures, by 4.6° C in dogs, and by 4.4° C in one rabbit. The experiments were performed late in the hibernating season, and plasma was diluted to 50% by normal saline, thus making results not conclusive. However, the ability of nonhibernating animals to tolerate normal temperature after transfusion from hibernating animals may suggest an existence of an active labile substance in the blood of hibernating groundhogs.

A65-81461
RELATIVE VISCOSITY AND OTHER FUNCTIONS OF THE BLOOD OF HIBERNATING AND ACTIVE ARCTIC GROUND SQUIRRELS.
Raymond J. Hock (Calif., U., White Mountain Res. Sta., Big Pine).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/13, 1964, p. 185-196; Discussion, p. 196-198. 19 refs.

The relative viscosity of the blood of hibernating Arctic ground squirrels, Citellus undulatus, is about 50% higher than that found in wild active animals over the range of temperature from 5.8° to 36° C. The hematocrit, erythrocyte number, and hemoglobin are increased about 33% in the hibernators. Plasma relative viscosity and protein concentration are increased about 10%. There is no apparent seasonal change in relative viscosity of the blood in the active group in spring, summer, and fall.

A65-81462
ANTIGEN DISAPPEARANCE IN GROUND SQUIRRELS IN HIBERNATION FOR 14, 28 AND 56 DAYS AFTER INJECTION.
Bernard N. Jaroslow and Douglas E. Smith (Argonne Natl. Lab., Div. of Biol. and Med., Ill.).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/16, 1964, p. 235-240; Discussion, p. 240-241. 6 refs.
USAEC supported research.

Although the rate of the injected antigen (blood serum albumin) disappearance is barely or not at all detectable in some hibernating ground squirrels, part or all of the events that take place during the induction period can occur if the hibernation is long enough. In the group that hibernated for 14 days, the post-hibernation induction period was shortened by 1.3 days, but in no case was it completely eliminated; whereas after 56 days of hibernation, 3 of 6 animals, upon arousal, began immediately to eliminate antigen at the immune rate. It would appear, then, that events of the induction period, such as the maturation of antibody-forming cells, can take place during hibernation.

A65-81463
AUTONOMIC NERVOUS INFLUENCE ON THE HEART OF THE HYPOTHERMIC HIBERNATOR.
Kjell Johansen, John Krog, and Ola Reite (Oslo, U. Inst. for Exptl. Med. Res.; and Ullevaal Hosp., Norway).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/17, 1964, p. 243-253; Discussion, p. 253-255.

The autonomic nervous communication may persist in the hypothermic European hedgehog at body temperature levels down to 5° to 7° C. thoracic temperature. During rewarming from hypothermia, the heart is geared to a maximal rate and effort, rendering it seemingly irresponsive to even the strongest inhibitory stimuli via the vagus. A distinct difference seems to exist between peripheral and central cardiovascular effectors in that peripheral responses like vasoconstriction and vasodilation persist at temperatures rendering the heart noneffective in answering the same stimulus. A possible acceleratory effect on the heart may exist after all nervous communication has ceased. This may be related to a direct effect on the myocardium through the impact of the returning blood.

A65-81464
SOME ASPECTS OF WATER BALANCE IN THE HIBERNATING BAT.
Frank C. Kallen (Rochester, U., Sxhool of Med. and Dentistry, Dept. of Anat., N. Y.).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/18, 1964, p. 257-265; Discussion, p. 266-267. 13 refs.
Grant PHS HE-06260.

Water content, loss, and consumption were studied in groups of active and hibernating little brown bats (Myotis lucifugus) near the end of the winter hibernation period. With available water, they maintained a body water content near 68% when caged at 20° to 24° C., and 69.5% in a hibernaculum at 2° to 6° C. In bats deprived of water at room temperature, environmental humidity short of near saturation had little effect on retention of body water. Circulating air accelerated water loss, apparently by disturbing a humid microclimate. During hibernation, however, bats in dry air lost water 3 times more rapidly than those in a high humidity; these in turn lost water at 1/20th the rate of bats at room temperature. Body water content of 67.3% was compatible with continuous hibernation, 65.2% was not. The animals appeared less resistant to dessication as the hibernating season drew to a close, at which time active bats died upon losing 16% of total body weight (26% of body water). Fasting, active bats averaged 2.7 ml water intake/bat/day at 20° to 24° C. Bats in a hibernaculum drank less than half this amount upon arousal. They may also have imbibed some water while in a more torpid state.

A65-81465
SOME EXTERNAL (CLIMATIC) AND INTERNAL (ENDOCRINE) FACTORS IN RELATION TO PRODUCTION OF HIBERNATION.
C. Kayser, G. Vincendon, R. Frank, and A. Porte (Strasbourg, U., Fac. de Med., Inst. de Physiol., France).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/19, 1964, p. 269-281; Discussion, p. 281-282. 40 refs.

It is possible to elicit hibernation one or two months in advance of the normal season by placing the hibernators (garden dormice, ground squirrels, hamsters) in a dark refrigerator in summer. Hibernation ensued, which was similar to normal hibernation. The adrenal cortex showed a stress reaction as a result of low temperature. The signs of adrenal stress are accompanied by signs of thyroid activity. Hibernation is accompanied by parathyroid hyperactivity, bone decalcification and dental caries. Oxygen consumption and ATP synthesis of brain homogenates and isolated mitochondria showed that ATP synthesis is more intense in hibernators than in homoiotherms. The P/O ratio proportionately increased in hibernators in summer only; in winter it remains unaltered, because oxygen consumption also is increased. Oxygen consumption, ATP synthesis and P/O ratio of myocardium homogenates were lower in winter hibernators (hamsters and ground squirrels) than in homoiotherms (rats and guinea pigs). There is, in hamster, a seasonal rhythm of oxygen consumption of brain homogenates: oxygen consumption is higher in winter irrespective of the state of hibernation.

A65-81466
ON THE STATE OF WATER IN THE TISSUES OF HIBERNATORS.
B. J. Luyet (Am. Found. for Biol. Res., Madison, Wis.).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962 Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/21, 1964, p. 295-309; Discussion, p. 309. 10 refs.
ONR supported research.

A comparison of the ability of blood plasma to hinder the crystallization of its water, as judged by the crystallization pattern obtained upon rapid freezing, indicated that hamster's plasma exerts a slightly greater impediment to freezing than in rats. A comparison of the rewarming temperatures at which freezing, which had been thus hindered, was completed, and at which a stable equilibrium was reached by recrystallization, did not reveal an appreciable difference between the two animals. Two remarkable differences between rats and hamsters were noted in the course of this work: (a) The paw of the hamster frozen at -10° C and kept for an hour in the frozen state recovered completely in 10 days, whereas the paw of the rat lost its fingers and a part of the palm. (b) The blood clotting time was much shorter, but considerably more susceptible to be lengthened by the addition of magnesium in the case of the hamster than in that of the rat.

A65-81467
THE EFFECT OF SOME AUTONOMIC DRUGS ON CITELLUS TRIDECEMLINEATUS DURING THE HIBERNATING CYCLE.
Charles P. Lyman and Regina C. O'Brien (Harvard U., Harvard Med. School and Museum of Comp. Zool., Dept. of Anat., Boston, Mass.).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/22, 1964, p. 311-320; Discussion, p. 320-323. 8 refs.
Contract AF 41(657)-380; and Grants PHS RG-5197 and RG-5611.

The control of circulation in undisturbed ground squirrels was studied during all phases of the hibernating cycle by infusing drugs into the blood stream. Asystoles, which are typical of the animal entering hibernation, serve to maintain a more even temperature-heart rate curve as the animal enters hibernation. Parasympathetic block abolished these asystoles though the animal was still entering hibernation. In hibernation it did not affect the rate and vagal stimulation or parasympathomimetics did not slow the heart unless it has been first accelerated. This change in sensitivity was associated with continuance of a faster rate rather than change in temperature. Acetylcholine and methacholine caused cardioacceleration in deep hibernation, which was only partially blocked by atropine. Hexamethonium or B-TM10 abolished the cardioacceleratory action of parasympathomimetics, indicating mediation via sympathetic cardioacceleratory fibers. Cardioacceleration, produced pharmacologically or by mechanical stimulation, was immediately preceded by muscle action potentials. Curarization abolished the potentials and the cardioacceleration, thus suggesting a reflex.

A65-81468
EXPERIMENTAL HYPOTHERMIA AND BROWN ADIPOSE TISSUE IN THE RAT.
N. Mrosovsky (London, U. Coll., Med. Res. Council for the Exptl. Invest. of Behaviour, Dept. of Psychol., Great Britain).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/24, 1964, p. 333-341; Discussion, p. 342-343. 17 refs.

Certain changes occur in the histology, color and weight of the brown fat of rats following repeated hypothermia. It may be that these are relevant to understanding the role of this tissue that occurs so widely in hibernating animals. The experiments in which these effects were found are described and suggestions made as to their biological value and cause.

A65-81469
DIURNAL RHYTHMS AND HIBERNATION.
Hermann Pohl (Natl. Res. Council, Div. of Appl. Biol., Ottawa, Canada).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/26, 1964, p. 361-372; Discussion, p. 372-373. 37 refs.

During entry into hibernation the 24-hr periodicity determines the beginning of the daily drop of body temperature and also controls the ratio of activity time and rest time. The measurable rhythms of physiological functions, oxygen consumption, heart rate, body temperature, etc., disappear during deep hibernation at body temperatures below 10°C.; but their reappearance due to the influence of seasonal adaptations in the organism seems possible. However, it has been shown that endogenous rhythms of body temperature and oxygen consumption can still be functioning at low body temperatures in mammals, at least for several days, by gradually decreasing their amplitude. Whether their disappearance during deep hibernation is caused only by low tissue temperature or also by specific metabolic changes in the naturally hibernating animal is not yet known. The regular awakening from hibernation as shown in hamsters, ground squirrels, and dormice, apparently caused by an internal temperature-compensating oscillator system, cannot be explained until information concerning the basis or functioning of such a system in higher animals, such as homeotherms, has been obtained. An electronic model used by R. Wever may represent a basis for understanding the mutual interaction of the endogenous and exogenous components of the biological 24-hr periodicity.

A65-81470
TOLERANCE OF CITELLUS LATERALIS AND C. SPILOSOMA FOR WATER DEPRIVATION.
Marvin L. Riedesel, Lawrence R. Klinestiver, and Nancy R. Benally (N. Mex., U., Biol. Dept., Albuquerque).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962 Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/27, 1964, p. 375-386; Discussion, p. 386-388. 9 refs.
Grant NSF G-14495.

An investigation was made of the effects of dehydration as a factor in hibernation of Citellus lateralis lateralis (golden mantled ground squirrel) and Citellus spilosoma marginatus (spotted ground squirrel). One C. lateralis survived 28 days and one C. spilosoma 42 days without water. The similarity of the responses of C. lateralis and C. spilosoma to water deprivation is of particular interest because they inhabit very different ecological areas. The renal capacity of C. spilosoma is probably greater than that of C. lateralis as evidenced by less weight loss of the former during the first day of water deprivation. A species difference was also noted as there was no change in the water content of C. lateralis kidney tissue wheras the percentage of water of kidney tissue from dehydrated and hibernating C. spilosoma was greater than control values. Hibernation effects redistribution of body water in both animals. The shifts are apparently due to the cooling of tissues rather than loss of water since the decreased water content was significant after only two days of hibernation. The loss of water by cells during hibernation is undoubtedly associated with the movement of one or more electrolytes, presumably magnesium, potassium, and/or sodium.

A65-81471
THE PHYSIOLOGICAL ROLE OF BROWN ADIPOSE TISSUE.
Robert E. Smith (Calif., U. Med. Center, Dept. of Physiol., Los Angeles).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/28, 1964, p. 389-397. 19 refs.
Grant NIH CA04271.

The postulate that brown adipose tissue serves as a sympathetically regulated thermogenerator in defense of homeothermy in the cold exposed rat is believed to be fully affirmed by the data presented here: (a) Brown adipose is an actively respiring tissue displaying in response to cold exposure a marked hyperplasia and vascular development coupled with a significant rise in tissue metabolic rate and a topically measureable heat production. (b) The intimate relation of brown adipose tissue to the vascular supply of the thorax suggests that this tissue provides a closely applied heating jacket over these supplies which together with countercurrent heat exchange buffers the thoracic core from undue cooling by the peripheral returns. (c) Direct heating of vital centers such as the cervical and thoracic cord and the sympathetic ganglia as well as the heart and lungs is provided by specially organized blocks of brown adipose in the interscapular and superior deep cervical regions respectively, which by direct vascular returns supply heat to these vital structures. (d) Evidence is adduced to show that these thermogenic effects of brown adipose are under control of the sympathetic nervous outflows, which appear to supply the necessary on-off regularity monitoring of the thermogenic response of this tissue to cold.

A65-81472
SEASONAL CHANGES IN PER CENT OF COLLOID AND CELL HEIGHT OF THE THYROID GLAND FROM HEDGEHOG.
Paavo Suomalainen (Helsinki, U., Dept. of Physiol. Zool. Finland).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicaw, Series A, IV. Biologica, 71/30, 1964, p. 415-418; Discussion, p. 418-420. 6 refs.

Seasonal changes in percentage of epithelium and colloid of the thyroid gland in the hedgehog, Erinaceus europaeus, were evaluated. The activity of the gland seems to have its maximum in spring and early summer. In midsummer the percent of epithelium is already a little smaller and the percent of colloid larger than normal. The activity of the gland evidently reaches its minimum in autumn before the onset of hibernation. The gland decreases only minutely during the early and midwinter and is smallest in animals with body temperature under 4° C. It is concluded that cold does not activate the thyroid gland in the hedgehog in autumn and winter during the hibernating period. Explanations of the inactivity of the thyroids in the hedgehog in cold are suggested.

A65-81473
SOME EFFECTS OF HYPOXIA ON RESPIRATORY METABOLISM AND PROTEIN SYNTHESIS IN RAT TISSUES.
A. P. Sanders, D. M. Hale, and A. T. Miller, Jr. (N. C., U. School of Med., Dept. of Physiol., Chapel Hill).
American Journal of Physiology, vol. 209, Aug. 1965, p. 443-446. 12 refs.
Contract DA-49-193-MD-2371.

Nembutalized rats were pump ventilated with 5% oxygen-95% nitrogen for periods of 60 or 105 min. Samples of liver, kidney, and brain obtained at the end of the period of hypoxia were used for ATP determinations and for polarographic measurements of respiration, respiratory control, and oxidative phosphorylation. In some experiments, leucine-C^{14} was injected intravenously after 60 min of hypoxia, and tissue uptake and incorporation of leucine into protein determined after an additional 45-min period of hypoxia. After 105 min of hypoxia, brain ATP was reduced 20%, liver ATP 40%, and kidney ATP was unchanged. The incorporation of leucine-C^{14} into protein was moderately depressed in brain and kidney and almost completely abolished in liver. The polarographic studies indicated that the capacity of tissue homogenates for basal and ADP-stimulated respiration and for oxidative phosphorylation was not impaired by 60 or 105 min of severe hypoxia. It is concluded that the damaging effects of hypoxia, of the severity and duration studied, are due mainly to the reduction in tissue ATP levels rather than to damage of the ATP-producing system.

A65-81474
BLOCKAGE OF EPINEPHRINE-INDUCED HYPERGLYCEMIA DURING EXPOSURE TO SIMULATED ALTITUDES.
Michio Ui (Hokkaido U. School of Med., Fac. of Pharm. Sci., Dept. of Biol. Chem., Sapporo, Japan).
American Journal of Physiology, vol. 209, Aug. 1965, p. 353-358. 18 refs.

Hyperglycemia elicited by subcutaneous injection of epinephrine (10 μg/rat) was completely abolished during the exposure of the rat to a simulated high altitude (220 to 250mm Hg). Addition of 5% to 7% CO_2 to the inspired gas during the altitude stress restored the hyperglycemic activity of epinephrine, suggesting that the alkalosis or hypocapnia provoked by hyperventilation, but not hypoxia itself, would be involved in the prevention of the hyperglycemic action of epinephrine. Glucose tolerance tests and in vitro experiments using isolated rat diaphragm showed that the inhibitory action of epinephrine on peripheral glucose utilization was abolished by shifting the pH of body fluids or incubation media toward higher levels. It was concluded that alkalosis, either directly or indirectly, abolished the hyperglycemic action of epinephrine as a consequence of the release of the inhibitory action of epinephrine on muscle glucose utilization.

A65-81475
EFFECTS OF ALTITUDE ACCLIMATIZATION ON BONE AND MARROW VOLUME IN DOG.
Joseph K. Gong (State U. of N. Y. at Buffalo, School of Dentistry, Dept. of Oral Biol., Buffalo).
American Journal of Physiology, vol. 209, Aug. 1965, p. 347-352. 25 refs.
U. S. Navy Bureau of Medicine and Surgery supported research.

Skeletons of altitude-acclimatized, altitude-deacclimatized, and sea-level control dogs were completely analyzed for water, fat, and nonfatty organic and inorganic fractions. The total skeletal and marrow volumes as well as their contents were calculated and compared. Neither the marrow volume nor the

bone (trabecular and cortical) volume was affected by the altitude changes. The relative distribution of marrow and bone in the various parts of the skeleton was also unchanged. Marrow fat in the whole skeleton as well as in the individual parts of the skeleton was lowered on acclimatization and increased on deacclimatization. Of the fat lost, one-third was from the flat bones. The marrow water as well as the functional marrow (fat-free, by definition) in either the whole or the various parts of the skeleton was increased on acclimatization.

A65-81476
A PSYCHOLOGIST LOOKS AT AIR MOVEMENT.
Frederick H. Rohles, Jr. (Kan. State U., Inst. of Environ. Res., Manhattan).
ASHRAE Journal, Jul. 1965, p. 48-49.

An hypothesis is formulated which states that all winds of 10 mph or greater are unpleasant regardless of temperature, and that those of 5 mph and less have their own discrete curves of acceptability and affectivity under different temperature conditions. The hypothesis is based on research with monkeys in which an operant conditioning technique was used to measure the aversive properties of winds of different velocities at different temperatures. The results showed that when the temperatures were 50^0, 60^0, and 70^0 F, winds of 10 and 20 mph were avoided approximately 95% of the time.

A65-81477
DETERMINATION OF DIFFUSION CAPACITY OF THE LUNGS WITH THE AID OF CARBON MONOXIDE [DE BEPALING VAN DE DIFFUSIECAPACITEIT VAN DE LONGEN MET BEHULP VAN KOOLMONOXYDE].
H. M. Beumer (Mil. Hosp. Dr. A. Mathijsen, Utrecht, The Netherlands).
Nederlands Militair Geneeskundig Tijdschrift, vol. 18, 1965, p. 89-102.
28 refs. In Dutch.

Several methods of measurement and calculations of diffusing capacity of the lungs are reviewed. The spirographic method using a carbon monoxide and helium mixture (Forster-Krogh) is discussed in detail as to its advantages and possible sources of error. Sample values of pulmonary diffusing capacity at rest and during exercise are given in table form, selected from 60 normal individuals and 300 patients.

A65-81478
MASKING WITH TWO TONES
David M. Green (Pa., U., Philadelphia).
Journal of the Acoustical Society of America, vol. 37, May 1965, p. 802-813.
15 refs.
NSF and NIH supported research.

The masking produced by two, equal-intensity sinusoids on a signal, a third sinusoid located midway in frequency between the two maskers, is measured as a function of the frequency separation between the two maskers. Three signal frequencies are used 250, 1000, and 4000 cps. At small frequency separation, the detectability of the signal is independent of center frequency and simply dependent on the frequency separation of the two maskers. As large frequency separations are approached, the masking suddenly diminishes and this larger critical frequency separation, which is frequency-dependent, is approximately the width of the envelope of excitation on the basilar membrane when excited by a sinusoid. The interpretation of these results in terms of a simple energy detector followed by a simple integrator is discussed.

A65-81479
GAS-CHROMATOGRAPHIC METHOD FOR THE DETERMINATION OF TOXIC SUBSTANCES IN LIQUID OXYGEN USED IN AVIATION [METHODO GASCROMATOGRAFICO PER LA DETERMINAZIONE DEGLI INQUINANTI NELL'OSSIGENO LIQUIDO AVIO].
E. Cianetti, G. Pecci, and G. Scuderi (Aeron. Mil., Lab. Chim. - Tecnol., Rome, Italy)
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Jan.-Mar. 1965, p. 26-45.
In Italian.

A rapid (half hour) and accurate gas chromatographic method is described and diagrammed for determining the main organic and inorganic pollutants of liquid oxygen used in aviation. The pollutants include: methane, acetylene, ethylene, ethane, hydrocarbons, carbon dioxide, nitrous oxide, refrigerants (freon, etc.), and solvents (trichloroethylene, carbon tetrachloride, etc.). Organic pollutants are determined with ionizing gas chromatography and inorganic substances with a thermistor detector in two times before preconcentration. Included are chromatograms of substances and concentrations detected in liquid oxygen. Detection of these pollutants enhances flight safety.

A65-81480
LATENCY MODELS FOR REACTION TIME DISTRIBUTIONS.
D. H. Taylor (Reading, U., Great Britain).
Psychometrika, vol. 30, Jun. 1965, p. 157-163. 19 refs.

This paper presents an adaptation of the method of moments for comparing observed and theoretical distributions of reaction time. By using cumulants in place of moments, considerable simplification of the treatment of convoluted distributions is obtained, particularly if one of the components is normally distributed. Stochastic latency models are often poorly fitted by reaction time data. This may be because a simple latency distribution is convoluted with a normal or high-order gamma distribution. The comparison method described will assist investigation of this and other interpretations of reaction time distributions.

A65-81481
MANIFEST ANXIETY, AMPHETAMINE, AND PERFORMANCE.
Martin Weitzner (N.Y. City Coll., Dept. of Student Serv., New York).
Journal of Psychology, vol. 60, May 1965, p. 71-79. 17 refs.
Contract USPH-M-987; and DA-49-007-MD-76.

Ninety-six subjects were selected from a group of 420 male undergraduate students screened with the Taylor Manifest Anxiety Scale. The subjects were divided into a low-manifest-anxiety group, a middle-manifest-anxiety group, and a high-manifest-anxiety group. Half of each group received amphetamine sulfate two hours prior to the experiment while the other half was given a placebo. The experiments included performance on noncompetitive and competitive paired-associates lists, digit-letter coding, and pursuit rotor performance. Amphetamine significantly facilitated performance on the noncompetitive paired-associates list, the simple digit-letter coding, and the pursuit rotor. Manifest anxiety level was significantly related only to the performance on both paired associates lists. It is concluded that in the present study amphetamine appears to have acted as a nonspecific drive factor in relation to performance more so than did the manifest anxiety level.

A65-81482
LEAD EXCRETION AND HEALTH OF ANTIKNOCK BLENDERS.
Lester W. Sanders (Cincinnati, U. Coll., Coll. of Med., Kettering Lab., Ohio).
Archives of Environmental Health, vol. 10, Jun. 1965, p. 886-892. 16 refs.

The levels of urinary lead concentration of persons engaged in various jobs in gasoline refineries concerned with producing leaded gasoline, and of gasoline loaders, was no greater than those of the general population. Since alkyl lead compounds may be absorbed through the skin, lungs, and the alimentary tract, the lack of evidence of their absorption under conditions prevailing in the occupations under study demonstrates the satisfactory quality of control measures. Lead is being excreted in the urine of these workmen within narrow limits of concentration; no relationship has been found between rate of lead excretion and existence of possible or actual impairment of the physiologic functions examined. No evidence was obtained to suggest that the health of these workers was influenced adversely by their employment.

A65-81483
MIDDLE EAR MUSCLE ACTIVITY IN CATS DURING SLEEP.
James H. Dewson III, William C. Dement, and F. Blair Simmons (Stanford U. Med. Center, Palo Alto, Calif.)
Experimental Neurology, vol. 12, May 1965, p. 1-8. 16 refs.
Grants Natl. Inst. of Mental Health MH-08185; and Natl. Inst. of Neurol. Diseases and Blindness B2167.

A high level of activity in the middle ear muscles was recorded from cats during rapid eye movement sleep. In contrast, these muscles were found to be relatively inactive during slow-wave sleep. This result was obtained from records both of the electromyogram (EMG) of the middle ear muscles, and of the contraction-induced attenuation of a steady-state acoustic signal recorded at the round window. The activity of these muscles during sleep is thus apparently similar to that of the extraocular muscles.

A65-81484
INTERNATIONAL STANDARD REFERENCE ZERO FOR PURE-TONE AUDIOMETRY.
Hallowell Davis (Central Inst. for the Deaf, St. Louis, Mo.)
(Am. Acad. of Opthalmol. and Otolaryngol., 69th Ann. Session, Chicago, Oct. 18-23, 1964).
Transactions American Academy of Ophthalmology and Otolaryngology, vol. 69, Jan-Feb. 1965, p. 112-118. 7 refs.
Grant PHS B-3856.

An International Standard Reference Level for Pure-Tone Audiometers soon to be released by the International Standards Organization at Geneva is presented. The new standard reference level is based on 15 separate studies of the hearing of young adults, carried out in 5 different countries since 1946. The literature was carefully scanned to include all published data that were collected under appropriate audiometric conditions, by up-to-date psychoacoustic methods, with suitable screening and motivation of subjects, and with reliable physical calibration of the instruments. Subjects used in these studies were simply screened against otological abnormality, either visible or in their medical history, and were encouraged to do a conscientious job of listening. Results obtained in the different countries and by different investigators agreed extremely well with one another. This reproducibility is one of the reasons for favoring the new international levels. Procedures which may be useful in avoiding confusion during the transition period are described, including the suggestion that every audiogram be labelled either ASA-1951 or ISO-1964.

A65-81485
INVERSION OF PHOTIC EVOKED POTENTIALS IN THE VISUAL CORTEX OF CONSCIOUS RABBITS [INVERSIIA VYZVANNYKH POTENTSIALOV NA SVET V ZRITEL'NOI KORE BODRSTVUIUSHCHEGO KROLIKA].
V. B. Polianskii and T. V. Isakova (M. V. Lomonosov Moscow State U., Dept. of Psychol. and Dept. of Physiol. of Higher Nervous Activity, USSR)
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 15, Jan.–Feb. 1965, p. 140–147. 11 refs. In Russian.

A microelectrode study of one and the same point of the visual cortex was made in alert and anesthetized rabbits. Inversion of the phases of primary response to light appeared at one and the same depth in 75% of the cases. In experiments on alert rabbits the same three types of inversion of the primary response were found as in anesthetized rabbits. A focus of a nonspecific afterdischarge and of two negative waves of the response was found in the depth of the cortex of an alert rabbit. A description is given of the temporal and amplitude characteristics of the primary response on the surface of an alert rabbit's cortex.

A65-81486
FIRST COSMIC EXPEDITION. BIOMEDICAL RESEARCH [PERVAIA KOSMICHESKAIA EKSPEDITSIIA: MEDIKO-BIOLOGICHESKIE ISSLEDOVANIIA].
P. Vasil'ev, V. Kovalev, and V. Terent'ev
Aviatsiia i Kosmonavtika, no. 6, 1965, p. 22–26. In Russian.

Physiological data have been recorded by direct telemetric methods during the orbital flight of the Soviet space ship Voskhod I. One of the outstanding factors during this mission was the light clothing worn by the crew, instead of the usual, heavy, pressurized space suits. Accordingly, special physical conditions had to be maintained inside the space cabin: the temperature fluctuated between 17° C and 22° C, the relative humidity was 47% to 48%, the barometric pressure 762 to 800mm Hg, and the oxygen concentration 20% to 22%. The carbon dioxide concentration did not exceed normal limits. These conditions permitted evaluation of physiological data not as a function of variable ambient factors, but depending on other parameters, such as acceleration, weightlessness and emotional impact on the nervous system.

A65-81487
HUMAN PERFORMANCE IN INDUSTRY.
K. F. H. Murrell.
New York, Reinhold Publishing Corp., 1965, xix+496 p. Many refs.

The interest in human performance in industry was enhanced by studies, carried out during the last war, on limitations of performance and the capacities of man engaged in operating complex machinery and equipment. The following topics are included in the discussions of this book: (1) anatomy and physiological functions of the human body forming the physical basis of man's perception of his environment; (2) design of equipment and furnishings which would permit better performance; (3) environmental factors, such as ambient temperature, humidity, noise, visual environment, and hand vibration; (4) methods of investigating, organizing, and inspecting work conditions; and (5) the effect of various daily shifts and age on performance.

A65-81488
MODERN PULMONARY FUNCTION DIAGNOSIS IN THE EXAMINATION FOR FITNESS TO FLY IN THE AIR FORCE [MODERNE LUNGENFUNKTIONSDIAGNOSTIK BEI UNTERSUCHUNG AUF WEHRFLIEGERVERWENDUNGSFAHIGKEIT].
H. W. Kirchhoff (Flugmed. Inst. der Luftwaffe, Fürstenfeldbruck, West Germany).
Wehrmedizin, vol. 2, 1964, p. 49–59. 6 refs. In German.

Methods currently used in the diagnosis of pulmonary function disorders as part of the regular physical check-up of pilots are inadequate for detection of early stages. An improved battery of pulmonary function indices has been worked out by the Institute of Aviation Medicine of the German Air force. Preliminary findings on pilots are discussed in relation to a battery consisting of the following values: tidal volume, respiratory rate, respiratory minute volume, vital capacity, maximal respiratory minute volume, expiratory volume (Tiffenau test), breath holding, inspiration time/expiration time, residual volume, respiratory equivalent (respiratory minute volume (BTPS)/oxygen consumption (STPD)), and lung compliance.

A65-81489
MEASUREMENT ON FAT CONTENTS OF ROKAF PILOTS AND AIRMEN BY MEANS OF SKINFOLD METHOD.
Kyong Wha Park (10th Base Hosp., Suwon, Korea).
IN: FOURTEENTH PACAF MEDICAL CONFERENCE: PROFESSIONAL PAPERS, TOKYO, JAPAN, NOV. 30–DEC. 2, 1964.
[n.p.], [1965], separately paged. 41 refs.

A comparative study was made of fat content in pilots and other airmen in the Republic of Korea Air Force (ROKAF). First fat content was measured by skinfold thickness and densiometry calculations. These results were integrated into a regression equation, and this equation was used to measure fat content in 500 airmen including the pilots. The fat weights of the pilots (92) were greater than those of the airmen (408). In the group as a whole fat weight averaged 10.1 kg and fat free weight 51.9 kg. The ratio of fat weight to fat free weight was 19.4% and the ratio of fat weight to total body mass was 16.1%. In fat free weights there was no significant difference between pilots and airmen. An appendix is added which gives anthropometric data of the 500 men and other information used in calculating skin fold thickness and fat content.

A65-81490
A MEDICAL TRAINING PROGRAM FOR FLIGHT NURSES.
Mary M. Code.
IN: FOURTEENTH PACAF MEDICAL CONFERENCE: PROFESSIONAL PAPERS, TOKYO, JAPAN, NOV. 30–Dec. 2, 1964.
[n.p.], [1965], separately paged.

A program of training flight nurses in continuous orientation to their job responsibilities is outlined. The program was for both new nurses and those familiar with flight nursing. A brief review of the flight nurses' duties is given, and the broad outlines of the program are listed. This program stresses the leadership role of the flight nurse. Topics presented in the training sessions are: (1) placement of patients on the aircraft; (2) nursing care planning for aeromedical evacuation; (3) assignment of medical crew members; (4) basic principles in evaluating personnel; (5) evaluation of performance of medical technicians; and (6) selection and provision for instruction of medical technicians.

A65-81491
KNOWLEDGE OF RESULTS AND CAUTIOUSNESS IN SIGNAL DETECTION.
Lawrence C. Hartlage.
Psychonomic Science, vol. 2, Jun. 15, 1965, p. 347–349. 7 refs.

Sixteen subjects were tested on the Rotter Level of Aspiration Board and classified as cautious or noncautious. A tone masked by white noise was presented to subjects at their respective stimulus thresholds on 30 of 60 trials, with 30 blank trials. Noncautious subjects made significantly more false positive errors than did cautious subjects. With knowledge of results, both cautious and noncautious subjects made fewer errors; but noncautious subjects still made significantly more errors than the cautious subjects.

A65-81492
CARBON DIOXIDE AND OXYGEN ELECTRODES FOR ARTERIAL BLOOD ANALYSIS IN A CARDIOPULMONARY PHYSIOLOGY LABORATORY.
May K. Purcell and Theodore Rodman (Veterans Admin. Hosp., Med. Res. Lab., Cardiopulmonary Physiol. Div., Philadelphia, Pa.)
American Journal of Medical Electronics, vol. 4, Apr.–Jun. 1965, p. 82–86. 12 refs.

Using the electrode technique, an 8-ml blood sample could be readily analyzed in duplicate for its oxygen and carbon dioxide tensions, and pH in less than 15 minutes. In general, an excellent correlation was obtained between the newer electrode and the older conventional techniques. The carbon dioxide electrode was trouble free. The oxygen electrode occasionally gave false low results. Since these errors were reproducible on duplicate determination, it is concluded that a blood sample should be analyzed with independent oxygen electrodes to ensure confidence in the accuracy of the results.

A65-81493
PROPOSAL FOR AN OBJECTIVE REPRESENTATION OF STRESS IN CIRCULATORY FUNCTION TESTS [VORSCHLAG ZUR OBJEKTIVIERUNG DER BELASTUNG BEI KREISLAUFFUNKTIONSPRUFUNGEN].
H. Welters and G. Fritze (Greifswald U., Hyg.–Inst., West Germany).
Das deutshe Gesundheitswesen, vol. 19, Dec. 24, 1964, p. 2411–2414. 12 refs. In German.

A nomogram is described which represents a simple method of calculation of cardiovascular efficiency taking into consideration the height of steps, leg length, body weight, and preselected physical load. This method is in agreement with the theory proposed by Arnold (1956). Further tests are considered using a larger number of subjects.

A65-81494
CONE ACTIVITY IN THE LIGHT– INDUCED DC RESPONSE OF MONKEY RETINA.
Peter Gouras and Ronald E. Carr (NIH, Bethesda, Md.)
Investigative Ophthalmology, vol. 4, Jun. 1965, p. 318–321. 6 refs.

In the rhesus monkey the action spectrums for eliciting Direct Current (DC) responses and rod-mediated Electroretinogram (ERG) are not identical. Long wavelengths are relatively more effective than short wavelengths in eliciting DC responses, indicating that cone receptors must be contributing to the DC response. The relative effectiveness of short wavelengths for evoking DC responses increases with dim light stimulation, suggesting that a Purkinje shift occurs.

A65-81495
PREPYRIFORM ELECTRICAL ACTIVITY IN THE RAT DURING HIGH ALTITUDE EXPOSURE.
Dorothy E. Woolley and Paola S. Timiras (Calif. U., Dept. of Physiol., Berkeley).
Electroencephalography and Clinical Neurophysiology, vol. 18, Jun. 1965, p. 680-690. 17 refs.
Grant PHS GM-09267.

The effects of two hour exposure to simulated altitudes of 12 500 and 18 000 ft on the electrical activity of the olfactory cortex were studied in awake, unrestrained rats with electrode implants in the prepyriform cortex and in the lateral olfactory tract (LOT). Terminal oscillations of the evoked potential were more susceptible than initial waves to the effects of high altitude. At 18 000 ft the number of oscillations in the evoked response decreased. Latency between stimulus artifact and the beginning of the prepyriform response increased 6% and 14% after two hours at 12 500 ft. and 18 000 ft, respectively. Of the components, synpathic delay was more sensitive than conduction to high altitude exposure. At 18 000 ft a marked depression of the olfactory cortex was demonstrated by 40% to 50% reductions in amplitude and number of waves per burst and in the duration of these spontaneous bursts of beta waves; frequency decreased 10% to 20%. Beta waves became normal 10 minutes after the return to sea level. Decreased frequency and increased amplitude of respiratory waves suggested that respiration was slower and deeper after two hours at 18 000 ft.

A65-81496
THE ELECTRODERMOGRAM (TARCHANOFF EFFECT) DURING SLEEP.
R. J. Broughton, R. Poire, and C. A. Tassinari (Centre St. Paul, Marseille; and Centre Psychotherap., Nancy, France).
Electroencephalography and Clinical Neurophysiology, vol. 18, Jun. 1965, p. 691-708. 40 refs.

The electrodermal response (Tarchanoff effect) was studied during sleep in 32 normal subjects and a number of subjects presenting pathological phenomena. Spontaneous electrodermal responses (EDR's) were rare during wakefulness and were without significant changes during falling asleep. They increased in number with passage to sleep stage IV. During sleep stage II they were isolated or related to K complexes and occasionally to the presence of generalized myoclonic jerks. During sleep stages III and IV EDR's became virtually continuous. In sleep stage I^{rem} (rapid eye movements), however, they were infrequent and either isolated or associated with bursts of REM's and/or partial myoclonic jerks, tachycardia, or respiratory changes. EDR's could be elicited by various stimuli in all stages, always with a 1 to 4 second latency. In stages II, III, and IV the threshold was lowered, whereas in stage I^{rem} it was quite high. Topographically, EDR in all phases diffused caudally down the body axis and peripherally along the limbs. The apparent morphological basis and certain psychological correlations are discussed.

A65-81497
INFLUENCE OF HIBERNATION AND OF INTERMITTENT HYPOTHERMIA ON THE FORMATION OF IMMUNE HEMAGGLUTININS IN THE GROUND SQUIRREL.
R. K. Andjus, Olivera Matić, V. Petrović, and V. Rajevski (Belgrade U., Fac. of Sci., Inst. of Physiol.; and Inst. of Biol., Yugoslavia).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.)
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/2, 1964, p. 25-34; Discussion, p. 34-36. 7 refs.

In ground squirrels, hibernation delayed production of hemagglutinins after injection of foreign blood cells. On rewarming, the agglutinin titer reached within a week values which were higher than those found in the controls. Hibernation also slowed down the decrease of antibody titer, when hemagglutiins were formed prior to hibernation. Induced hypothermia prolonged the survival of Cr51-tagged foreign blood cells in the blood stream but did not prevent their almost complete destruction within 12 hours. Intermittent hypothermia delayed the appearance of hemagglutinins in the blood stream for a week and slowed down the decrease in the titer after it reached a peak value, but had little effect on the rate and amplitude of its increase from the moment hemagglutinins were formed. Quantitative estimation of rewarming ability without the use of external heat showed variations due to seasonal changes, degree of thermal acclimatization, and natural hibernation.

A65-81498
HIBERNATION AND TEMPERATURE EFFECTS ON THE AGEING OF RED BLOOD CELLS.
Mary Anne Brock (NIH, Natl. Heart Inst., Gerontol. Branch, Bethesda; and Baltimore City Hosp., Md)
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.)
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/4, 1964, p. 51-62; Discussion, p. 63. 18 refs.

Alterations in cellular metabolism associated with senescence may be studied readily in cell types which differentiate to a mature form, live for a fixed period of time, and then die. Erythrocytes represent such a cellular population; for, once they are mature, they do not dedifferentiate but survive as enucleate cells until they are removed from the circulation. The life of red blood cells may be subdivided into two phases, the development of cells from erythroblasts to circulating reticulocytes and the left span of mature erythrocytes. Hibernation and temperature affect the metabolism of these cells during both phases, as shown in studies with rodents.

A65-81499
LONG TERM STUDIES ON INDIVIDUAL HIBERNATING ANIMALS.
Felix Strumwasser, James J. Gilliam, and Jerrel L. Smith (Walter Reed Army Inst. of Res., Dept. of Neurophysiol., Washington, D. C.).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/29, 1964, p. 399-412; Discussion, p. 413-414. 11 refs.
Contract DA-49-193-MD-2119.

Data based on long-term measurements of brain temperature from three ground squirrel species (Citellus: lateralis, tridecemlineatus, and beecheyi) during hibernation are described. These data clearly indicate that in an environment of constant cold and with a fixed light schedule, hibernation does not persist indefinitely after it starts. There are many awakenings, which interrupt the process bringing all three species to the state of their temperature cycle for time durations of one-half to one day on the average. The animals probably arouse to reconstitute chemical templates (occurring particularly within neurons) which represent the storage of some orderly sequence of instructions (innate and learned). Denervated tissues of different type show an increased chemosensitivity, particularly to the natural transmitter substance in the normal nerve terminals. An additional parameter must be included with denervation supersensitivity to facilitate explaining the slow increase in extent of hypothermia with each early hibernation. This parameter is the presence of cells in the brain with properties of discharging only at certain times of day or with periodicities close to but not exactly a sub-multiple of 24 hr. The answer to what starts the animal hibernating in the autumn and what stops the process in the spring under constant conditions of cold temperature and light cycle is yet to be determined.

A65-81500
ENZYME ACTIVITIES DURING HIBERNATION AND AROUSAL IN THE GROUND SQUIRREL, CITELLUS TRIDECEMLINEATUS.
Marilyn L. Zimny (La. State U., School of Med., Dept. of Anat., New Orleans).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/33, 1964, p. 443-452; Discussion, p. 452-453. 25 refs.
Grant NIH A-2027.

Activities of three enzymes in cardiac and skeletal muscle from hibernated and awakened ground squirrels (Citellus tridecemlineatus) were investigated. The three enzymes assessed included: (1) adenosine triphosphatase (ATPase), (2) acetylcholinesterase (ACHase), and (3) adenosine triphosphate-creatine transphosphorylase (ATP-Cr-P). Results show that there is not significant change in activities of the enzymes ATPase and ACHase in either cardiac or skeletal muscle during hibernation. The heart also maintains the activity of ATP-Cr-P. The significant decrease which occurs in ATP-Cr-P in skeletal muscle is attributed to the relatively spastic, flexed, stationary state of the limbs and the lack of rephosphorylating activity at the reduced body temperature. Upon awakening from hibernation, a quick, massive breakdown of adenosine triphosphate results in an accumulation of adenosine diphosphate, a temporary inhibition of ATPase activity and an increase in oxygen consumption, while augmented ACHase activity aids in restoring muscle function. ATP-Cr-P activity remained relatively stable during periods of arousal studied.

A65-81501
LIPOGENESIS OF COLD-EXPOSED AND HIBERNATING GOLDEN HAMSTERS.
Arliss Denyes and Joan Baumber. (Queen's U., Biol. Dept., Kingston, Ontario, Canada).
(Second Intern. Symp. on Nat. Mammalian Hibernation, Helsinki, Aug. 27-30, 1962, Proc.).
Annales Academiae Scientiarum Fennicae, Series A, IV. Biologica, 71/9, 1964, p. 129-139; Discussion, p. 139-140. 18 refs.
Ontario Res. Found. supported research.
Grant Natl. Res. Council of Canada A-650.

The major burden of increased lipogenesis in the cold-exposed and hibernating hamster falls upon the white fat depots. The greater lipogenesis of epididymal fat pads from the winter acclimatized and hibernating hamsters as compared to the summer acclimated animals is a result of the consistently higher lipogenesis of the animals whose testes involuted in the cold (ST).

Thus, high epididymal fat pad lipogenesis is unusually correlated with involution of the testes. The frequency of hibernation is far greater when a large number of ST animals occur, as in the winter. There is no evidence to prove a direct relation among these phenomena but these correlated differences in response to cold exposure do suggest the existence of two physiological races in the authors' strain of golden hamsters.

A65-81502
MECHANISM OF CIRCULATORY RESPONSES TO SYSTEMIC HYPOXIA IN THE ANESTHETIZED DOG.
Hermes A. Kontos, H. Page Mauck, Jr., David W. Richardson, and John L. Patterson, Jr. (Med. Coll. of Va., Dept. of Med., Richmond).
American Journal of Physiology, vol. 209, Aug. 1965, p. 397-403. 20 refs.
Grants DA MD 49-193-65-9153; NIH HTS-5573; NIH FR 000 16-02.

The possibility that mechanisms secondary to the increased ventilation may contribute significantly to the circulatory responses to systemic hypoxia was explored in anesthetized dogs. In 14 spontaneously breathing dogs systemic hypoxia induced by breathing 7.5% oxygen in nitrogen increased cardiac output, heart rate, mean arterial blood pressure, and femoral arterial flow, and decreased systemic and hindlimb vascular resistances. In 14 dogs whose ventilation was kept constant by means of a respirator pump and intravenous decamethonium, systemic hypoxia did not change cardiac output, femoral arterial flow, or limb vascular resistance; it significantly decreased heart rate and significantly increased systemic vascular resistance. In seven spontaneously breathing dogs arterial blood pCO_2 was maintained at the resting level during systemic hypoxia. The increase in heart rate was significantly less pronounced but the other circulatory findings were not different from those found during hypocapnic hypoxia. Thus, mechanisms secondary to increased ventilation contribute significantly to the circulatory responses to systemic hypoxia. Hypocapnia accounts partly for the increased heart rate, but not for the other circulatory responses.

A65-81503
FINE MORPHOLOGY OF THE SENSORY CELLS IN THE ORGAN OF CORTI OF MAN.
Robert S. Kimura, Harold F. Schuknecht, and Isamu Sando (Mass. Eye Infirmary, Sect. of Otolaryngol.; and Harvard Med. School, Boston).
Acta Oto-Laryngologica, vol. 58, Nov. 1964, p. 390-408. 30 refs.
Grant PHS NB 03932-03.

The morphological characteristics of the sensory cells and neural elements in the human cochlea (Post mortem specimens from 8 patients with no history of ear problems) were studied with the electron microscope. The hairs of the outer sensory cells were arranged in a W form with at least six rows. The basal body or diplosomes were found in the cuticle free zone in the sensory cells. The subcuticular zones of the outer sensory cells frequently contained numerous osmiophilic inclusions. Two types of nerve endings, dendrites and axons, were observed below both the outer and inner sensory cells. The external bundle was large and composed of numerous, closely packed nerve fibers. In specimens from older patients there were some evidences of nerve endings degeneration at the base of hair cells.

A65-81504
COMPARATIVE STUDIES OF AUDIOMETRIC BONE CONDUCTION.
Jadwiga Tronczyńska (Med. Acad., Dept. of Otolaryngol., Łódz, Poland).
Acta Oto-Laryngologica, vol. 58, Dec. 1964, p. 510-514. 7 refs.

The audiometric measurements of bone conduction were carried out on two different places of the skull, i.e. on the mastoid process and on the frontal bone. A comparison of the two methods of examination revealed that frontal bone conduction seems to give a better idea of the real state of the inner ear: (1) the mechanical forces of the middle ear are mostly responsible for the conduction of middle frequencies, and (2) frontal bone conduction is less influenced by the mechanical forces of the middle ear and reflects more obviously the state of the inner ear.

A65-81505
EFFECT OF TYMPANIC MUSCLE ACTIVITY ON MOVEMENT OF THE EARDRUM, ACOUSTIC IMPEDANCE AND COCHLEAR MICROPHONICS.
Aage R. Møller (Karolinska Inst., Dept. of Physiol. II, Stockholm, Sweden).
Acta Oto-Laryngologica, vol. 58, Dec. 1964, p. 525-534. 23 refs.
Swedish Med. Res. Council supported research.

In anesthetized cats and rabbits a contraction of the tensor tympani produced a negative pressure change in the meatus indicating an inward movement of the eardrum. A contraction of the stapedius muscle produced no change or considerably smaller pressure change which could be either positive or negative. Simultaneous contraction of the two muscles produced a negative change in the air pressure the magnitude of which was smaller than that produced by the tensor tympani alone. Independent contraction of the stapedius and the tensor tympani muscles produced a change within the same range of magnitude in the acoustic impedance as well as in the cochlear microphonics of both muscles acting together was greater than that produced by either of the muscles when contracting alone.

A65-81506
LACK OF PERCEPTION OF EYE MOVEMENTS AND CORNEO-CONJUNCTIVAL ORIGIN OF THE SUBJECTIVE DEVIATION OF THE EYES IN VESTIBULAR NYSTAGMUS [NICHTWAHRNEHMUNG DER AUGENBEWEGUNGEN UND CORNEO-CONJUNCTIVALE ENTSTEHUNG DES SUBJEKTIVEN AUGENZUGES BEIM VESTIBULAREN NYSTAGMUS].
G. Lange and H. H. Kornhuber (Freiburg U., Universitätsklin. fur Hals-, Nasen- und Ohrenkranke, and Abt. für Klin. Neurophysiol., Freiburg i. Br., West Germany).
Acta Oto-Laryngologica, vol. 58, Dec. 1964, p. 503-509. 11 refs.
In German.

During rotatory tests carried out in a dark room 28 healthy persons were asked if they noticed any sensation of eye movements. Nystagmus was recorded electrically. With intact sensibility of conjunctiva and cornea there was no perception of eye movements in 2/3 of the tests. In 17% of the tests the subjects felt a constant unilateral deviation of the eye balls, in 13% to the side of the slow nystagmus phase, and in 4% deviation in the opposite direction was felt. The subjects felt fast rhythmical eye movements in only 11% of the tests. Opening or closing the eyes did not influence these findings. As soon as the cornea and conjunctiva were anesthetized, there was no sensation of eye movement during vestibular nystagmus. It is concluded that corneal and conjunctival sensation plays an integral role in the perception of eye movement. Thus proprioceptors of the eye muscles are not sufficient for conscious sensation of eye movement. These findings are in agreement with the fact that there is a lack of grouped neuronal discharge simultaneously with vestibular nystagmus of the cerebral cortex in cat in the absence of vision.

A65-81507
ENERGY COST OF ALTERNATING POSITIVE AND NEGATIVE WORK.
C. M. Hesser (Karolinska Inst., Dept. of Physiol., Labs. of Aviation and Naval Med., Stockholm, Sweden).
Acta Physiologica Scandinavica, vol. 63, 1965, p. 84-93. 26 refs.

The energy cost of walking up and down a Λ-shaped, 1 m high staircase was studied in subjects in terms of the O_2 requirement for performing the work under truly aerobic conditions. Two different speeds of walking were used, yielding external work loads of k x 14.7 kpm/min (k = body weight of individual in kg) in both the positive and negative phases. At the lower speed the net O_2 cost per kg b.w. averaged 16.8 ml/min, independent of sex; at the higher speed the corresponding value was 33.0 ml/min in the men, and 32.0 estimated to k x 8.2 kpm/min for men and women at the lower speed and to k 16.2 and k 15.7 kpm/min for men and women, respectively, at the higher speed. The ratio of O_2 costs for the positive and negative works approximated 8:1 at the lower speed, and 5:1 at the higher speed. During each period of positive work the calculated O_2 demand of a 70 kg man exceeded the O_2 supply to the working muscles by about 60 ml at both speeds. This O_2 debt of 60 ml could be contracted without any increment in the lactacid O_2 debt and supports the notion that a certain amount of O_2 can be released from the myoglobin O_2 store before anaerobic processes become involved. The O_2 capacity of this aerobic debt mechanism was calculated to be in the order of 3 ml per kg of active muscle tissue. Evidence is presented that, in the steady state, the upper limit for performing work under truly aerobic conditions corresponds to about 70 percent of the maximal O_2 consumption.

A65-81508
MIXED VENOUS CO_2 TENSION- DETERMINED BY A CO_2 REBREATHING METHOD. INFLUENCE OF REBREATHING TIME.
G. Lundin and D. Thomson (Lund U., Inst. of Physiol., Aero-Med. Lab., Sweden).
Acta Physiologica Scandinavica, vol. 63, 1965, p. 55-57.

The influence of rebreathing time when using a CO_2 rebreathing method for graphical determination of the mixed venous CO_2 tension was studied. An almost significant difference of 0.6 mm was found between values obtained at rebreathing rates of 30 and 50 breaths per min with rebreathing times of 22 and 13 sec. This should give a difference at rest of about 5 percent when the cardiac output is calculated, with the higher value when the fast rate is used for the mixed venous CO_2 determination. The solubility of CO_2 in lung tissue probably does not cause this difference.

A65-81509
EFFECT OF MUSCULAR STRESS OF DURATION ON DIFFERENT COMPONENTS OF MOTOR REACTION OF LOWER EXTREMITIES IN YOUNG ATHLETES [VLIIANIE MYSHECHNOI NAGRUZKI NA DLITEL'NOST' OTDEL'NYKH KOMPONENTOV DVIGATEL'NOI REAKTSII NIZHNIKH KONECHNOSTEI U IUNYKH SPORTSMENOV].
M. I. Pavlov.
Novosti Meditsinskoi Tekhniki, no. 2, 1964, p. 85-89.

The studies of changes in different components of motor reaction of the lower extremities in athletes during warming-up training and competition showed that quantitative determination of their values depends on the neurodynamic state of the individual. In studies of the stress of different intensity it is necessary to evaluate each component: latent period, duration of stress, motor activity, and maximal stress of each leg. The data of each component can permit evaluation of a degree of each preceding stress.

A65-81510
AUTOMATIC DETERMINATION OF PULSE RATE AND RESPIRATION [AVTOMATICHESKII ANALIZ CHASTOTY PUL'SA I DYKHANIIA].
IU.V. Miagkov.
Novosti Meditsinskoi Tekhniki, no. 2, 1964, p. 59-65.

An automatic device is described which permits recording of pulse rate and respiration by a time-lapse method. This method permits recording of parameters of several patients during a given period. It does not give continuous data but allows computation of average readings, which is useful in follow-ups of critical cases or healthy persons engaged in hazardous occupations, such as divers, test pilots and astronauts.

A65-81511
CARBON MONOXIDE POISONING.
George Smith (Aberdeen U., Dept. of Surg., Scotland).
Annals of the New York Academy of Sciences, vol. 117, Jan. 21, 1965, p. 684-687. 16 refs.

In treating carbon monoxide poisoning, it should be borne in mind that, while oxygen combines with hemoglobin 10 times faster than carbon monoxide, the latter dissociates from hemoglobin about 250 times slower than oxygen. The dissociation time can be speeded up, however, by altering the partial pressure of the reactant gases. This can be accomplished by placing the patient in a pressure chamber containing pure oxygen under 2 atmospheres pressure absolute. The author cites cases of carboxyhemoglobemia. Practically all patients responded favorably to this treatment. The optimum pressure seems to be two atmospheres. Higher pressure, as applied in animal experiments, produced hyperventilation, convulsions and death. A measure of success may be due to the speed with which the subject with carbon monoxide poisoning can receive this treatment. A small pressure chamber fitted in ambulances should be given careful consideration.

A65-81512
OXYGENATION OF THE TISSUE CELL.
R. E. Forster (Pa. U., Graduate School of Med., Dept. of Physiol., Philadelphia).
Annals of the New York Academy of Sciences, vol. 117, Jan. 21, 1965, p. 730-735. 27 refs.

The studies of the tissue cell oxygenation process indicate that gradients in the order of tens of mm Hg probably exist between blood leaving a capillary bed and the sites of O_2 reduction. The largest pressure differences probably exist between the blood in the capillaries and the most distant cells they supply. These gradients would presumably be the same under conditions of high O_2 tension, except in so far as O_2 consumption and capillary blood volume are altered. A decrease in temperature would certainly lower metabolic rate decreasing pO_2 gradients, but it would also reduce the capillary blood volume increasing them. It is difficult to predict what the net effect on the pO_2 gradients would be. The major lack at present is definitive information about the O_2 consumption/capillary blood volume under these various conditions.

A65-81513
POISONING OF CELLULAR REACTIONS BY OXYGEN.
Niels Haugaard (Pa. U., Schools of Med., Dept. of Pharmacol., Philadelphia).
Annals of the New York Academy of Sciences, vol. 117, Jan. 20, 1965, p. 736-744. 28 refs.
Am. Heart Assoc. supported research.
Grant NIH HE-01813.

All living organisms are susceptible to oxygen toxicity. Although convulsions in mammals may be the most dramatic manifestation of oxygen toxicity, the toxic action of oxygen takes many forms and has been found to occur in all or almost all species of animals or plants observed under elevated pressures of oxygen. It is, therefore, unlikely that there is one mechanism of oxygen poisoning. It is much more reasonable to suppose that oxygen in toxid concentrations has many actions on metabolism and function, some more and some less important under different conditions and in different species. The changes in tissue oxygen concentrations may produce metabolic effects which are physiological rather than toxic and may be of great importance in the regulation of cell function. Further studies of the mechanism of oxygen toxicity can be expected to have great practical and theoretical importance: we may discover protective measures, which will allow us to extend the time that man may safely be exposed to hyperbaric oxygenation and understand better the role of oxygen in the regulation of cell metabolism and fuction, both underconditions of air breathing at sea level and in the presence of increased tensions of oxygen.

A65-81514
EFFECTS OF SLEEP DEPRIVATION ON VISUAL FUNCTION.
A. Paul.
Aerospace Medicine, vol. 36, Jul. 1965, p. 617-620. 10 refs.

Twenty students, 18 years of age, were deprived of sleep for 50 hours. Before, during, and after this period of sleep deprivation visual examinations were repeated at intervals, testing visual acuity, muscle balance, stereoscopic vision, tachistoscopic perception and color vision. Only after 46 hours of speeplessness was a very small decrement noticed. After a short period of sleep (5 hours) visual function returned to its original state.

A65-81515
MICROWAVE HEATING: A STUDY OF THE CRITICAL EXPOSURE VARIABLES FOR MAN AND EXPERIMENTAL ANIMALS.
Lothar O. Hoeft (AF Systems Command, Aerospace Med. Div., Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 36, Jul. 1965, p. 621-622. 6 refs.

Extrapolating the results of microwave heating experiments from various species of animals to man has been done frequently without accounting for interspecies differences in mass and size. The objective of this study was to derive a theoretical basis for extrapolation and to suggest ways to improve experiments designed to investigate nonthermal effects of microwaves. The exposure times required to produce a 5° C temperature rise in man and experimental animals were calculated as a function of the microwave intensity using a simplified model. These calculations show that, while the intensity for which infinitely long exposures are permitted is approximately the same for all species, higher intensities will elevate temperatures quicker in small animals than in larger ones. This difference in heating rates should be taken into account in experiments designed to investigate the nonthermal effects of microwaves.

A65-81516
INTERNATIONAL ASPECTS OF AIRCRAFT ACCIDENTS.
Donald W. Madole (Civil Aeron. Board, Bur. of Safety, Hearing and Reports Div., Washington, D. C.).
(Symp. of the Joint Committee on Aviation Pathol., Washington, D. C., Oct. 12-14, 1964).
Aerospace Medicine, vol. 36, Jul. 1965, p. 632-634.

The essential international rules of accident investigation reside in the World Organization which resulted from the convention on International Civil Aviation (ICAO). At a conference on International Civil Aviation held in Chicago, Illinois, in December 1944, an international convention was written which was ratified by the United States Senate on August 9, 1946. Fifty-four nations participated in the Chicago meeting. Soviet Russia is not a signatory to ICAO. Pertinent Articles of the ICAO are described and discussed, as well as the ICAO Accident Investigation Manual. The state of occurrence is responsible for the accident investigation, including official identification, pathological examinations, and human factor determinations. The internationally recognized right of access to casualities, both dead and alive, resides with the state of occurrence and the state of registry.

A65-81517
MULTIPLE DISINTERMENTS IN EQUATORIAL AFRICA.
J. K. Mason and S. W. Tarlton (R.A.F. Inst. of Pathol. and Trop. Med., Halton, Bucks, Great Britain).
(Symp. of the Joint Committee on Aviation Pathol., Washington, D. C., Oct. 12-14, 1964).
Aerospace Medicine, vol. 36, Jul. 1965, p. 636-639.

The investigation of an accident involving a commercial aircraft which took off after a refueling stop from an airport in Equatorial Africa is described and discussed. Two features emphasizing difficulties of accident investigation "in the field" are included: (1) the conflict between the desire for a wholly satisfactory investigation and the sociological duty to dispose of the human remains as soon as possible, and (2) the presence of any foreign investigator, no matter how good his intentions, must incite some local resentment. Probably the greatest lesson learned from this case is the importance of an early start to the medical investigation of any mass disaster. The delayed participation by pathologists mentally oriented toward accident investigation contributed largely to the failure to exclude pilot disease as a cause of the accident, and contributed to the failures to make any assessment of the survivability of the accident, and to identify positively more than a small proportion of the complement. The legal aspects involved in such an accident investigation are also discussed.

A65-81518
PROBLEMS OF MASS CASUALTIES IN AIRCRAFT ACCIDENTS.
Rudiger Breitenecker.
(Symp. of the Joint Committee on Aviation Pathol., Washington, D. C., Oct. 12-14, 1964).
Aerospace Medicine, vol. 36, Jul. 1965, p. 639-640.

The purpose of identification and examination of mass casualities is threefold: (1) humanitarian aspects (identification aids in relieving mental anguish and uncertainty on the part of relatives of the deceased), (2) investigational aspects (careful examination of the remains may provide clues to the cause of the accident and death), and (3) legal aspects (relatives can claim insurance benefits and settle questions of inheritance only if a body is identified and a death certificate is issued). The crash of a jet airliner on December 8, 1963, near Elkton, Maryland, is discussed with respect to the rescue operation and identification procedures used. Ten days of work in the field and additional work later at the State Medical Examiner's Office resulted in 77 positive identifications, documented by fingerprints, dental records, and physical characteristics or various combinations thereof. In four cases the name on the death certificate was listed as presumptive identification. These

identities had to depend on body characteristics, which were less than conclusive. None of the identifications had been challenged one year and a half following the disaster.

A65-81519
PRACTICAL PROBLEMS ARISING IN THE INVESTIGATION OF AIRLINE DISASTERS ABROAD.
P. J. Stevens (R.A.F. Inst. of Pathol. and Trop. Med., Halton, Bucks, Great Britain).
(Symp. of the Joint Committee on Aviation Pathol., Washington, D. C., Oct. 12-14, 1964).
Aerospace Medicine, vol. 36, Jul. 1965, p. 641-646.

The fact that an aircraft crash occurs overseas often adds considerably to the problems of ensuring a proper accident investigation, including identification of fatalities. Among the many problems involved in such accidents are the following: (1) location— is it an International Civil Aviation Organization country? (2) local motivation, experience, and custom; (3) speedy arrival in the accident area; and (4) speed in conducting the investigation. The solution to many of these problems will be made on an ad hoc basis and will depend largely on the tact and diplomacy of the people concerned. However, there are two conclusions which should be underlined since something can be done about them in advance. First, arrangements should be such that the arrival of the medical adviser to the accredited representative at or near the scene of the accident should be effected with minimum delay. This is absolutely essential if errors of omission and commission are not to be made at the outset, and if a working arrangement is to be achieved with local police and pathologists without initial misunderstanding. Second, an information service, such as used by many funeral director firms, is needed to go into action within a short time after a disaster takes place.

A65-81520
INVESTIGATION OF DITCHING ACCIDENTS.
A. F. Davidson (R.A.F. Inst. of Aviation Med., Farnborough, Hants, Great Britain).
(Symp. of the Joint Committee on Aviation Pathol., Washington, D. C., Oct. 12-14, 1964).
Aerospace Medicine, vol. 36, Jul. 1965, p. 646-648.

Three ditching accidents involving aircraft in service in the Royal Navy are described, and the third is discussed in detail. Mechanical assistance to aid rapid exit of aircrew from the cockpit of a sinking aircraft is recommended. It is considered advantageous to have an aviation medicine specialist with qualifications as a diver at the scene of the accident as soon as possible after the wreckage has been located so that preliminary investigation can be carried out under water.

A65-81521
OXYGEN TOXICITY: ULTRASTRUCTURAL AND METABOLIC ASPECTS.
Philip Felig (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
(Symp. of the Joint Committee on Aviation Pathol., Washington, D. C., Oct. 12-14, 1964).
Aerospace Medicine, vol. 36, Jul. 1965, p. 658-662. 25 refs.
NASA Order R-87.

Evidence is reviewed indicating that exposure of rats to oxygen at 760 mm Hg and at 258 mm Hg results in subcellular hepatic and renal alterations, in the absence of pulmonary histopathology. Mitochrondrial changes including enlargement, clumping and increased numbers of cytolosomes containing degenerating membranes constitute the striking findings. Thyroid overactivity is excluded as the basis for these changes inasmuch as protein-bound iodine is reduced (at 760 mm Hg) or remains the same (at 259 mm Hg). The possibility that alterations in the redox state of pyridine nucleotides may be the responsible toxic cellular mechanism is suggested by the protective action of sodium lactate and by in vitro studies on agents inducing mitochondrial swelling.

A65-81522
AEROSPACE TOXICOLOGY PROCEDURES: CURRENT PRACTICES AND TRENDS AT THE ARMED FORCES INSTITUTE OF PATHOLOGY.
Leo R. Goldbaum and Thaddeus J. Domanski (Armed Forces Inst. of Pathol., Toxicol. Branch, Washington, D. C.)
(Symp. of the Joint Committee on Aviation Pathol., Washington, D. C., Oct 12-14, 1964).
Aerospace Medicine, vol. 36, Jul. 1965, p. 662-664.

Qualitative aspects are presented of analyses of biological specimens to determine the presence of therapeutic concentrations of certain basic drugs. Direct ether extraction is applied to a relatively small amount of urine or solid tissue. Drug separation and purification are accomplished by simple, alkaline distillation. Drug identification and quantitative estimation are made by means of gas-liquid chromatography, ultraviolet spectrophotometry, and chemical tests.

A65-81523
AEROEMBOLISM TREATED BY HYPOTHERMIA: REPORT OF A CASE.
Robert O. Bauer, Mervin Campbell, Robert Goodman, Theodore L. Munsat, and Martin A. Pops (Calif. U., School of Med., Depts. of Surg./Anesthesiol. and Med., Los Angeles).
Aerospace Medicine, vol. 36, Jul. 1965, p. 671-675. 31 refs.
Contract AF 41(657)-358.

A case history of a patient with severe cerebral and brain stem damage, secondary to air embolism, is presented and discussed. This condition was induced during an attempt to abort pregnancy by blowing air through a catheter into the uterus. The patient displayed loss of consciousness, paresis, repetitive seizures, diffuse pulmonary congention, and cerebral edema. Descriptions are presented of procedures permitting successful treatment of this patient with hypothermia. It is concluded that the salvage of patients with dysbarism of aeroembolism and neurocirculatory collapse may be accomplished in the absence of hyperbaric chambers by careful application of whole body hypothermia.

A65-81524
MEDICAL EVALUATION OF AIRMEN EXPOSED TO ALTITUDES IN EXCESS OF 50,000 FEET.
Charles I. Barron (Lockheed-Calif. Co., Burbank), A. H. Schwichtenberg, and Robert R. Secrest (Lovelace Found. and Clin., Albuquerque, N. Mex.)
(Aerospace Med. Assoc. Meeting, New York, Apr. 27, 1965).
Aerospace Medicine, vol. 36, Jul. 1965, p. 665-668. 6 refs.

A number of military and civilian pilots have been exposed to altitudes in excess of 50000 ft during test and operational flights of jet-powered aircraft. While exposures in some cases have been of short duration others have involved exposures of many hours with some pilots accumulating up to 2000 hr in periods of 1 to 10 yr. Intensive medical surveillance of this group failed to reveal any evidence of radiation induced injuries or illnesses or, when compared with a nonexposed group of airmen, of any significant pathology caused by high altitude stresses. It is believed that the results of this survey, indicating engineering control of the high altitude environment and man's capability of adapting to a changing time-space relationship, is significant in its application to future operations of high performance commercial and military aircraft.

A65-81525
INTERNAL PERCEPTUAL SYSTEM NOISE AND REDUNCANCY IN SIMULTANEOUS INPUTS IN FORM IDENTIFICATION.
Charles W. Eriksen and Joseph S. Lappin (Ill. U., Urbana).
Psychonomic Science, vol. 2, Jun. 15, 1965, p. 351-352.
Grants PHS MH-1206; PHS K6-MH-22,014.

Identification accuracy of forms was studied as a function of the number of simultaneous occurrences of the form on different foveal locations. A model for computing perceptual independence was presented and the data suggest that, at a given moment in time, internal noise for different elements in the visual perceptual system, represented by different foveal locations is uncorrelated.

A65-81526
THE PHOTOCHEMICAL ORIGIN OF LIFE.
A. Dauvillier (Observatoire du Pic-du-Midi, Lab. de Phys. Cosmique, Bagnères-de-Bigorre, France).
New York, Academic Press, 1965, ix + 193 p. Many refs.

The author presents a concise but broadly based discussion of the origin of life on earth and in extraterrestrial space. The following topics are included: (1) chemical composition of living matter and, in particular, the importance of the carbon atom, of molecular dissymmetry and of the formation of macromolecules; (2) spontaneous generation /and cosmic panspermia theories, and man's ability to create organic compounds under laboratory conditions; (3) origin and evolution of the universe and of the solar system, and the physical processes involved; (4) development of the geophysical environment; (5) photochemical synthesis of organic matter as it exists on earth today; (6) evolution of living organisms from unicellular forms and the energetic systems involved; (7) the element cycles in the biosphere; and (8) general acceptance of life in the universe compatible with the physical and chemical conditions existing on planets.

A65-81527
QUANTIFICATION OF THE HUMAN NYSTAGMIC RESPONSE TO ANGULAR ACCELERATION. PREDICTION FORMULAE AND NOMOGRAPH.
James H. Brown and George H. Crampton (U.S. Army Med. Res. Lab., Fort Knox, Ky.)
Acta Oto-Laryngologica, vol. 58, Dec. 1964, p. 555-564. 5 refs.

Five young adult men with normal labyrinthine function were stimulated by a series of graded angular accelerations, during which they carried out particular mental tasks. Each subject was seated at the center of rotation, eyes open, and with head fixed with a bite board so that the lateral canals were in the horizontal plane of rotation. The subject was enclosed in a capsule which provided a totally dark environment, and shielded him from wind currents. Low-level masking noise and vibration prevented detection of extraneous cues related to angular velocity. Ocular nystagmus was analyzed second-by-second and an empiric equation fitted to the data.

A65-81528
FACTORS INFLUENCING CLINICAL OXYGEN TOXICITY.
John W. Bean (Mich. U., Dept. of Physiol., Ann Arbor).
Annals of the New York Academy of Sciences, vol. 117, Jan. 21, 1965, p. 745-755. 68 refs.

The exact mechanism of oxygen toxicity, as a result of breathing on increased concentrations of oxygen is not known, but numerous factors may influence its occurrence and severity. Fundamentally, it is determined by ambient oxygen concentration, duration of exposure, and individual susceptibility of the subject. In severe cases, the pulmonary function fails, leading to asphyxia or hyperoxic anoxia. Human lungs are more resistant to the toxic effects of oxygen than those of experimental animals, but upon continuous administration of pure oxygen, certain histopathologic changes occur in the capillaries and alveolar membranes. The retina is vulnerable to damages, particularly in infants. Young individuals are less susceptible to O_2 toxicity as manifested by O_2 convulsions, than are older ones. Low temperature, anesthesia, and thyroidectomy prevent the toxic effect. The basic cause of O_2 convulsions is not known, but it may be due to an increased metabolism. The endocrine system may play a large role in O_2 toxicity as shown in animal experiments, which may be complicated by nervous mechanisms. Still other factors may include changes in brain blood flow and the cerebral O_2 tension.

A65-81529
TOXICITY OF HYDRAZINE AND 1,1-DIMETHYLHYDRAZINE (UDMH).
C. F. Reinhardt (E. I. du Pont de Nemours and Co., Wilmington, Del.) and B. D. Dinman (Ohio State U., Columbus).
Archives of Environmental Health, vol. 10, Jun. 1965, p. 859-869. 29 refs.
Contract AF 33(657)-1698.

The question of hepatotoxicity following an acute exposure to sublethal concentrations of hydrazine and UDMH was studied in rats. Histological examination of the liver by light microscopy and measurements of the serum and liver enzymatic response were used as indicators of hepatotoxicity. A concomitant study was performed in which rats were exposed to a sublethal concentration of CC_{14} in order to establish a basis for comparison with a known hepatotoxic agent. The effects of fasting as they related to this experiment were also studied. UDMH was found to have little, if any, significant effect upon the liver. Hydrazine and CC_{14} were shown to produce liver changes with the effect of hydrazine being mild to moderate in contrast to the marked liver damage produced by CC_{14}.

A65-81530
QUANTITATIVE EVALUATION OF IMPEDANCE SPIROMETRY IN MAN.
L. E. Baker, L. A. Geddes, and H. E. Hoff (Baylor U. Coll. of Med., Dept. of Physiol., Houston, Tex.).
American Journal of Medical Electronics, vol. 4, Apr.-Jun. 1965, p. 73-77. 13 refs.
NASA Grant NAS 9-468.

The transthoracic, impedance-volume relationships were determined for normal, human seated subjects. With a pair of electrodes on the midaxillary lines at the level of the xiphoid and using a single regression line to represent the data, slender subjects exhibited an impedance-volume coefficient of 7 ohms/liter of respired air. In subjects of heavy build, the coefficient was 2 ohms/liter. Although the impedance decreased with increasing frequency throughout the frequency range of 50 to 600 kc, the magnitude of the impedance change from full expiration was essentially the same. It was concluded that the relative component of the impedance underwent national changes with respiration, while the reactive component was minimally altered.

A65-81531
A SUMMING COMPUTER FOR MEASURING EVOKED AUDITORY RESPONSES IN MAN.
Geary A. McCandless, Lavar G. Best (Colo., U. School of Med., Div. of Otolaryngol, Boulder), and John H. Larkins (Los Alamos Sci. Lab., N. M.).
American Journal of Medical Electronics, vol. 4, Apr.-Jun. 1965, p. 78-81. 5 refs.
Grant NIH B3449.

A special-purpose analog computer constructed for assessing hearing in children and adults unable to respond voluntarily and at a cost comparable to current automatic clinical audiometers is presented. The instrument detects evoked responses to auditory stimuli measured from the human scalp. The device was constructed as a single unit containing stimulus controls, a program circuit, memory circuit, and power supply. Auxiliary equipment include a strip-chart recorder, preamplifier, and oscilloscope. The evoked responses obtained with unit compare closely with those obtained from more complex and costly research computers.

A65-81532
STUDIES ON THE VISUAL EVOKED RESPONSE. I. THE USE OF THE 0.06 DEGREE RED TARGET FOR EVALUATION OF FOVEAL FUNCTION.
Albert M. Potts and Tadashi Nagaya (Chicago, U., Eye Res. Labs., Ill.).
Investigative Ophthalmology, vol. 4, Jun. 1965, p. 303-309. 10 refs.
Natl. Council to Combat Blindness, Inc. supported research.
Grant PHS NB-02522.

A narrow band stimulus which peaks at 690 mμ and subtends an angle of 0.06 degree causes a detectable visual evoked response in all normal subjects tested when 100 responses are summated by a computer. Eccentric fixation by as little as 2 degrees abolishes the response. Obstacles to image formation such as a corneal ulcer abolish the response. There is marked correspondence between subjective psychophysical findings and the visual evoked response. There is marked variation in response among individuals and in the same individual at different times. The level of subjective attention is one factor which helps account for the variability.

A65-81533
VISUAL EVOKED CORTICAL RESPONSE IN THE CAT.
Jerry H. Jacobson, Yoshiji Masuda, and Sherwood A. Jacobson (Cornell U. Med. Coll., Dept. of Surg. (Ophthalmol), New York, N. Y.).
Investigative Ophthalmology, vol. 4, Jun. 1965, p. 330-337. 15 refs.
Grant PHS NB 02113 and NB 05704.

The cortical response of the cat to light flashes has been studied, the locus of greatest amplitude of response noted, and the conformation described. Recordings through the dura indicate that there is diminution of the response amplitude and reduction of localization caused by the dura. The effects of stimulus parameter changes, of application of strychnine locally, and of intravenous pentobarbital were noted.

A65-81534
STEADY POTENTIAL SHIFTS DURING AROUSAL AND DEEP SLEEP IN THE CAT.
Robert H. Wurtz (Washington U. School of Med., Depts. of Neurol. and Physiol., St. Louis, Mo.).
Electroencephalography and Clinical Neurophysiology, vol. 18, Jun. 1965, p. 649-662. 21 refs.
Grants PHS NB 04513-01 and 5T1 NB-5240.

Steady potential and electrocorticogram were studied in 23 cats during wakefulness, slow wave sleep, and deep sleep. On awakening from slow wake sleep, a diphasic SP shift occurred. A small, inconstant, surface-negative shift was followed by a larger and more enduring positive one. The positivity persisted as long as the cat remained fully awake and subsided with the recurrence of slow wave sleep. An increase in the apparent level of behavioral arousal during a period of wakefulness was accompanied by a further increase in surface positivity. If there was only brief awakening, during which the cat was drowsy rather than alert, little or no SP change occurred. The onset of deep sleep was accompanied by SP changes similar to the ones seen on awakening. At the end of deep sleep, the surface positivity subsided with return to slow wave sleep. If the cat awakened from deep sleep to become immediately alert, the surface positivity did not disappear until the cat later became drowsy.

A65-81535
QUANTITATION OF THE ERYTHROPOIETIC STIMULUS PRODUCED BY HYPOXIA IN THE PLETHORIC MOUSE.
Clifford W. Gurney, Pamela Munt, Iris Brazell, and Diana Hofstra (Argonne Cancer Res. Hosp.; and Chicago U., Dept. of Med., Ill.)
Acta Haematologica, vol. 33, 1965, p. 246-256. 16 refs.

Plethoric mice were subjected to short periods of hypoxia and subsequently employed for the bioassay of erythropoietin elaborated. Production of erythropoietin is demonstrated after one hour in a hypoxic environment to which the animals have previously been exposed for 3 weeks, and is apparent in some mice after only 15 minutes exposure to severe hypoxia. Up to 24 hours exposure, the magnitude of the erythropoietic response increases with time, and for a constant interval of exposure the response increases with decreasing atmospheric pressure. In animals subjected to short periods of severe hypoxia survival is enhanced by previous adaptation to prolonged but less intense hypoxia.

A65-81536
REPEATED VERTICAL SEMICIRCULAR CANAL STIMULATION DOES NOT HABITUATE HORIZONTAL NYSTAGMUS IN CAT.
George H. Crampton and James H. Brown (U.S. Army Med. Res. Lab., Fort Knox, Ky.)
Acta Oto-Laryngologica, vol. 58, Nov. 1964, p. 441-448. 17 refs.

A group of cats was exposed to a series of angular accelerations about a vertical rotatory axis with the head tilted so that a synergic pair of vertical canals were in the plane of rotation, and then tested with the lateral canals in the plane of rotation. This group was compared with a second group that received only lateral canal stimulation, and with a third group that received neither lateral nor vertical canal stimulation. It was found that repeated acceleration of the vertical canals does not reduce that nystagmus elicited with the lateral canals accelerated in the plane of rotation.

A65-81537
VESTIBULAR RESPONSE TO SOUND: SINGLE UNIT RECORDING FROM THE VESTIBULAR NERVE IN FENESTRATED DEAF MICE (Df/Df).
D. Mikaelian (Johns Hopkins U. School of Med., Dept. of Otolaryngol., Baltimore, Md.)
Acta Oto-Laryngologica, vol. 58, Nov. 1964, p. 409-422. 11 refs.

Deaf mice of the Df/Df strain have degenerated cochleas, but histologically normal vestibular structures. After fenestration of the horizontal semicircular canal, tones and clicks were delivered to the fenestrated ears through the external auditory canal using a closed sound system. Single units of the vestibular nerve were picked out by tungsten microelectrodes. Single unit responses were obtained only in fenestrated animals and only for frequencies from 80 to 4200 cycles per second. Threshold was best for 1500 cycles per second and was at 78 dB re 0.0002 dynes/cm^2. Click responses were also obtained. Some units with the spontaneous activity were present in single units of nonfenestrated mice, but were not altered by tones or clicks and no units were driven by either type of sound stimulus. The mode of vestibular endorgan stimulation and unit patterns are discussed in light of the present experiments.

A65-81538
VISUAL CONTROL OF HABITUATION TO COMPLEX VESTIBULAR STIMULATION IN MAN.
Fred E. Guedry, Jr. (U.S. Naval Aviation Med. Center, U.S. Naval School of Aviation Med., Pensacola, Fla.)
Acta Oto-Laryngologica, vol. 58, Nov. 1964, p. 377-389. 28 refs.

Twenty men completed an experiment in the Pensacola Slow Rotation Room while it rotated for several hours at a rate of 45 deg/sec. Subjects were immobile (relative to the room) except for habituation series which consisted of head movements restricted to one plane and to a particular quadrant of that plane. Visual problems were presented with each head movement to one group of subjects; another group made all head movements of the habituation series in darkness. Tests conducted in darkness before and after the habituation series revealed pronounced reductions in nystagmus and subjective effects in the practiced quadrant only in the "visual task" group. The other group showed no reduction of nystagmus in either the practiced or unpracticed quadrant. This experiment considered together with another experiment just completed indicated that vision can be an important factor in habituation of human subjects to vestibular stimulation.

A65-81539
UPPER AIRWAY RESISTANCE IN NORMAL MAN DURING MOUTH BREATHING.
Helge Schiratzki (Karolinska Sjukhuset, Dept. of Otolaryngol. and Dept. of Clin. Physiol.; and Hosp. for Contagious Diseases, Lab. of Clin. Physiol., Stockholm, Sweden).
Acta Oto-Laryngologica, vol. 58, Dec. 1964, p. 535-554. 24 refs.

The pressure drop measured by a direct method after puncture of the cricothyroid membrane showed that the relationship between pressure difference and flow was curvilinear during both inspiration and expiration for both resting ventilation and hyperventilation; this indicated the presence of turbulent flow. All curves could be represented by second degree polynomials. Resting ventilation resistance tended to be higher than hyperventilation resistance. The mean upper airway resistance at a flow rate of 0.5l/sec was 1.0 cm H_2O/l/sec at rest. During hyperventilation it was 0.8 and 1.2 cm H_2Ol/sec for flow rates of 0.5 and 1.0l/sec respectively. The upper airway resistance was approximately one-half of the total airway resistance. The mechanical work performed in moving air through the upper airway was determined as the product of the ventilated volume and pressure drop across this segment of the tract. During resting ventilation it was 0.008 and 0.006 kpm/l of V_E for men and women, respectively, in which V_E indicates the resulting expiratory air flow.

A65-81540
SOME LEGAL RAMIFICATIONS OF AIRCRAFT ACCIDENTS.
Lee S. Kreindler (Kreindler and Kreindler, New York, N. Y.)
(Symp. of the Joint Committee on Aviation Pathol., Washington, D. C., Oct. 12-14, 1964).
Aerospace Medicine, vol. 36, Jul. 1965, p. 629-631.

Some basic concepts of aviation accident litigation are presented and discussed. Included are explanations of the system of law, how it works, and how it functions with respect to particular aircraft accidents. The author hopes that this discussion on the general application of the law to aircraft accidents will be of interest and value to doctors working in the field of aviation pathology.

A65-81541
SOME ASPECTS OF GOVERNMENT LIABILITY IN MILITARY AIRCRAFT ACCIDENTS
William J. Colley and Frank W. Kiel (Armed Forces Inst. of Pathol., Washington, D.C.)
(Symp. of the Joint Committee on Aviation Pathol., Washington, D.C., Oct. 12-14, 1964).
Aerospace Medicine, vol. 36, Jul. 1965, p. 635-636.

Liability of the U.S. Government for military aircraft accidents is based on statutes enacted in Congress. With 30 000 military aircraft being involved in 1,300 accidents per year, resulting in 500 deaths, there is an increasing need for adequate compensation to injured persons. The Federal Tort Claims Act and the Military Claims Act are two major laws allowing recovery against the United States. The courts have held, however, that military personnel on active duty may not recover from the government for injuries received incident to service. In certain circumstances the injured serviceman may be able to sue successfully the original manufacturer of the aircraft.

A65-81542
A STUDY OF UNITED STATES AIR CARRIER WATER ACCIDENTS, JULY 1954-JUNE 1964.
Bernard C. Doyle and Roland A. Roepe (Civil Aeron. Board, Washington, D.C.)
(Symp. of the Joint Committee on Aviation Pathol., Washington, D.C., Oct. 12-14, 1964?.
Aerospace Medicine, vol. 36, Jul. 1965, p. 648-658.

During the 10-year period, July 1954 through June 1964, 22 United States air carrier accidents involved land planes terminating their flight in water. Of the 1,266 passengers and crew members on board these 22 aircraft, 720 persons (56.9%) experienced fatal injuries while 546 persons (43.1%) survived with varying degrees of injury, ranging from severe to none. A study of these accidents divided into the following basic groups is presented: (1) aircraft lost with no survivors, (2) unintentional ditchings having survivors, and (3) premeditated ditchings having survivors. The following conclusions were made: (a) most present-day aircraft (except high-wing type) are capable of withstanding ditching impact forces and remain afloat for a sufficient length of time facilitating completion of successful evacuation, (b) successful evacuation is largely dependent on knowledgeable and well-trained crew members who can maintain authority and discipline before impact, during the evacuation from the ditched aircraft, and while awaiting rescue facilities to arrive, (c) life rafts, life jackets, and survival provisioning must be adequate to supply the needs of all occupants, be in good repair at all times, easily accessible in time of need, and instructions for their use clearly and simply stated, and (d) flotation equipment should be required, at least to the extent of having buoyant seat cushions on aircraft being operated on other than extended overwater flights.

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